Rev.02/2019

Agromehanika

ŽE OD 1968

TRACTOR MOUNTED MIST BLOWERS

AGP 1000 PRO

AGP 1500 PRO

AGP 2000 PRO

INSTRUCTIONS FOR USE

ACKNOWLEDGEMENT

We thank you for the trust, given when choosing our spraying device AGROMEHANIKA for chemical protection of plants. Reliability and performance of the device depends on your care for the device. Before connecting the spraying device to a tractor carefully read the instructions for use and heed to them, while operating the machine. Instructions contain essential information on effective and safe use and long life of the machine.

INDEX

EC DECLARATION OF CONFORMITY

MANUFACTURER:

AGROMEHANIKA, proizvodnja in trgovina Kranj, d. d.
Hrastje 52a, KRANJ, SLOVENIJA

declares that the product:

MIST BLOWER AGP 1000 PRO

MIST BLOWER AGP 1500 PRO

MIST BLOWER AGP 2000 PRO

is manufactured in accordance with:

1. **Directive on Machinery 2006/42/EC;**
2. **Directive 2009/127/EC amending the Directive 2006/42/EC, as regards machinery for pesticide application;**
3. **Rules on the requirements for the correct operation of equipment for the application of plant protection products, and on the conditions and method for inspections of such equipment (Official Gazette of the Republic of Slovenia, No. 101/2013)**

The following harmonized European standards on safety were applied:

SIST EN ISO 4254-1:2013 - Agricultural machinery – Safety – Part 1: General requirements

SIST EN ISO 4254-6:2010 - Agricultural machinery – Safety – Part 6: Sprayers and devices for distributing liquid fertilizers (ISO 4254-6:2009);

SIST EN ISO 4254-6:2010/ AC:2011 - Correction AC:2011 to standard SIST EN ISO 4254-6:2010;

SIST EN ISO 12100:2011 - Machine safety – General principles of planning – Risk assessment and risk reduction (ISO 12100:2010);

SIST EN ISO 13857:2008 - Machine safety – Safe distances, preventing reach of dangerous areas with upper or lower limbs.

Kranj, 12. 1. 2019

Head of production:
(resp. for. tech. documentation)

Matjaž Kuhar

Manager:

Jan Šinkovec

1 GENERAL

Spraying device is designed and constructed for applying chemical products in water-based solution, which are normally used for chemical protection of crops, on field crops. Construction design enables access to all vital elements of the sprayer and easy handling. Robust construction, quality component parts and a great deal of additional equipment enable the user to work reliably and use spraying agents and energy optimally. Never use the spraying equipment for pumping or spraying: this spraying equipment was designed and built for the application of water-soluble chemicals on crops, which are normally used for the chemical protection of agricultural crops.

Spraying device is not to be used for pumping or spraying of:

- water-based solutions with greater specific weight and viscosity than water;
- chemical solutions, whose compatibility with elements, built on the spraying device, is not reliable;
- drinking water;
- sea water and other saline solutions;
- water, with temperature exceeding 40 °C or lower than 5 °C;
- any kind of varnish or patina;
- quick acting diluters;
- oils and greases;
- liquids, containing granulates or floating hard particles.

2 HEALTHY-SAFETY WARNINGS AND MEASURES

2.1 Safety signs

	Sign on the left is a warning safety sign and is normally located on the machine with other signs. Respect instructions for safe work and act accordingly in extreme situations.

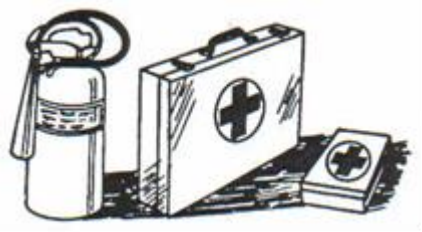
2.2 Maintenance of safety signs

	Carefully read instructions, regarding safety regulations, described in instructions for use of your machine. Ensure that the signs are clearly visible on the machine. After repairing the machine and changing component parts, make sure that the machine includes all required safety signs. Safety signs are available from authorized dealers. Learn the operation of your machine and proper handling and control units.

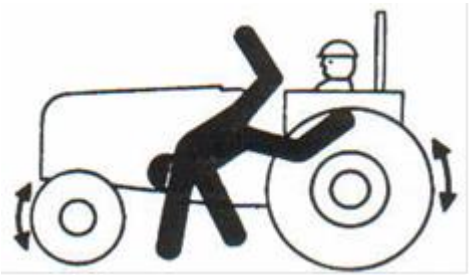
	**WARNING: Do not allow unauthorized persons to use the machine*!***

Ensure that your machine is in good technical condition. Each unauthorized change to the machine can diminish its function, as well as safe operation, and can shorten its life span.

2.3 Readiness for danger

	Be prepared for sudden fire. Make sure that a first aid kit and a fire extinguisher are always at hand, when working. Make sure that you have phone numbers of your doctor, emergency, clinic, hospital and fire service written in a visible location.

2.4 Removing unauthorized persons

	Every unauthorized person, riding on the machine, can have an accident (a fall from the machine or an injury by the machine). Person, riding on the machine, can affect the driver, who is controlling the machine, and can change the machine's barycentre. Person on the machine obstructs overview of the driver and can contribute to unreliable working conditions on the machine. Do not allow unauthorized persons to gain access to the machine

	WARNING: Driving unauthorized persons on the machine is prohibited!

2.5 Safety in handling with chemical products

Handle chemical products extremely carefully, to avoid potential injuries and dangers to health, as well as to the environment:

- Be very careful, when handling chemical products. Ensure that you do not have direct contact with chemical products. Handle chemical products as you would poisons.
- Choose chemical products, which are least dangerous to your health, most effective and easy soluble.
- Always read instructions for use, given on the chemical products. Regard regulations, safety measures and use instructions.
- When working, use respiratory protection, such as gas mask, helmet with fresh air.
- When preparing chemical products, wear appropriate clothing. When working, use protection mask, gloves, boots and protection clothing. Be careful with your protection equipment. Do not use "worn-out" protection.
- Make sure that your protection equipment and clothing is in good condition. Dirty gas mask can cause skin irritation. Change the filter regularly!
- Choose "safer" chemical products. When choosing chemical products, use products that are less irritant to the skin and do not cause dust.

- When choosing chemical products, prefer products, which have "safer" packaging;
- Prepare chemical products in the fresh air. When preparing products, turn off the machine to reduce the risk of spilling chemical products.
- Prepare chemical products in a wind-free environment or a calm location.
- Make sure that the machine is regularly cleaned, to reduce the possibility of direct contact with chemicals.
- During preparation and mixing of chemical products, use tools, intended for this purposes, litre scale, measuring tools, funnel, bucket. Regularly clean tools.
- Do not prepare more chemical products than needed.
- Make sure that your working day of using chemical products does not exceed eight hours. Avoid stress and great physical strains.
- Before spraying and eight hours after spraying do not drink alcohol.
- During work with chemical products, do not eat, drink or smoke.
- Do not try to free clogged nozzles by blowing with mouth.
- In the spraying period, heed to spray waiting period.
- In case of contact of chemical products with eyes, immediately rinse them with clean water.
- After spraying, wash your hands and face well before ingesting food and liquids.
- Disable children and animals to access the machine, until it is properly cleaned.
- After use, clean the machine properly and store it in a suitable place, so that unauthorized persons do not have access.
- After working with chemical products take a thorough bath.
- Clean and wash the machine after each use and before each maintenance procedure.
- If you have any health issues while dealing with chemical products, consult your physician and try to contact the dealer of the chemical product.
- If you have had an accident with a chemical product, we propose the following safety measures:
    - eyes and skin: rinse with plenty of clean water,
    - throat and oesophagus: drink water (not milk!!!),
    - respiratory paths: fresh air.

2.6 Labels for danger, according to danger level

Packaging of chemical products contains danger signs, which express the danger level. If possible, avoid chemical products, which have a skull symbol on their packaging or other symbols, warning about chemically corroding effect. If the packaging has no symbols for danger, this does not mean the chemical product is not harmful or dangerous. Even if you use chemical products without danger labels on their packaging, you have to be extremely careful, because they can be harmful to your health in case of long-term handling.

Danger signs which can be seen on packaging of chemical products:

					
1	**2**	**3**	**4**	**5**	**6**

1. acute toxicity;
2. acute toxicity, skin and respiratory tract irritant;
3. corrosive;
4. oxidising;
5. inflammable materials;
6. explosive materials – chemical products which can explode.

2.7 Danger of mechanical injuries

- do not touch the machine while operating;
- do not remove safety labels or any other safety equipment of the machine;
- do not exceed air pressure in the tyres;
- maintain the tyres regularly;
- if using the machine in the public traffic you must fit it with lights and other illuminates in accordance with traffic regulations;
- do not enter the tank while preparing or cleaning;
- never set working pressure above 15 bar (maximum allowed working pressure);
- do not start working until you are sure that there are no unauthorized people in the vicinity of the machine;
- pull out the key from the key-lock after you have finished working to prevent sudden, unwanted start of the machine.

2.8 Dangers, caused by liquids under high pressure

	Liquids, leaking from the pipes, can be under high pressure and can cause injuries to your skin, and cause dangerous injuries, if they spread under your skin. Never try to dismount a hydraulic pipe or any other of the hydraulic installation as long as this one is under high pressure. Before you start up the hydraulic system make sure that the installation is safe.

- Help yourself with a piece of cardboard when trying to find the place of leakage. Protect your hands and body by means of gloves and protective clothing if you are handling a high pressure hydraulic system.
- In case of injury, seek medical attention. To prevent severe injuries, each penetration through the skin must be stopped and liquids must be removed within a few hours.

2.9 Working place of operator

- There is only one person required to operate the machine. This person is also the tractor driver.
- This machine can be operated by a person older than 18 years and has the know-how that is needed for safe and accurate operation of spraying appliances and products.
- The person needs to be in good health – mentally and physically.
- Operational work and maintaining of the sprayer can only be carried out by authorized personnel, which is qualified for this type of work.
- Machine operator must undergo medical examination (in accordance with local regulations).
- The working place of the operator is 1 meter around the machine and tractor.
- While spraying keep the windows and doors of the tractor closed. It is recommended that the operator has a hermetically closed cabin which allows the operator to create overpressure with aeration of fresh air that disables chemically polluted air to enter the cabin.
- While spraying, it is recommended that the operator stays in the cabin for about 90-95% of the time, so the chemical products cannot have influence on his or her health. Should the operator notice a change in the working of his or her organs or feel sick, he or she should immediately put on the protection breathing mask. However, the best thing to do is to leave the field and look for shelter in a cleaner area.

2.10 Personal protection

- Machine operator must use well closed clothing and effective protection equipment during work.
- The operator can come in contact with chemicals through his or her skin, mouth or nose. If you do not work safely even the best protection equipment cannot be of any use to you.
- Safe work with sprayers requires full attention of machine operator, therefore, do not listen to music with headphones on while working.

WARNING: To prevent inhaling and/or entering the chemicals through the mouth it is recommended not to eat, drink or smoke while working!

2.11 Protection of respiratory system

There are many different filter and protections masks available to protect your respiratory system.

	It is recommended to use masks that protect the whole face and are fitted with combinations of different filters (filter for gas-smoke). An even more efficient protection can be achieved by means of a protection helmet in which overpressure can be created

- Make sure that you are using an appropriate filter:
  - A (brown): used for most organic chemicals;
  - B (grey): used for most inorganic chemicals;
  - P (white): used only for liquid or powder chemicals;
  - Combination of a brown/white filter with the mark A2P2 in the European Union is be used for most organic chemicals. The mark A2P2 refers to a combination of filters which provide appropriate protection against most gases and vapours that are created by using liquid or powder chemicals. A2 refers to protection class (2) which means that you can use the filter until it reaches a concentration of 0.5 volume-percentages. P2 refers to gas protection class (2).
  - The combination B (grey/white) filter must be used in the case of handling inorganic chemicals.
  - Before using the mask check the tightness and sealing of it. Check the mask for damages and make sure that the outer valve is clean and can be closed without any problems.
- Write down the date of the last usage of the filter. The A2P2 filter must be replaced once a month nevertheless how many times it was used. Filter B must be replaced after every single use! The filter must be used within 6 months after the packaging of the filter was opened. Make sure that used filters are destroyed in accordance with local regulations.
- Never check the efficiency of the filter by smelling:
  - certain poisonous elements are odourless,
  - the concentration of the poison cannot always be noticed by human nose,
  - smelling of certain elements can damage the nasal mucous membrane.
- Always check the expiry date of the filter.

	**WARNING: The filter must be hermetically sealed after use!**

2.12 Skin protection

Wear following clothing to protect your skin:

- Rubber gloves for agriculture and gardening to protect your hands, which must be long enough. If the gloves are worn out they need to be replaced. Change the gloves after every fifth use. Powder the inside of the gloves.
- Rubber or neoprene boots that are resistant to water and chemicals.

- Overalls that are resistant to water and chemicals and are fitted with a hood. The overall must cover the ends of gloves and boots.
- A waterproof apron for protection of your clothes; in a well-protected tractor cabin the apron can be removed.
- A mask that protects the whole face.

Make sure that all of your clothes are well cleaned after every use. Never perform spraying when your clothes are wet, since it can cause a strong contact with your skin. Be very careful in the case your skin gets injured. After handling chemicals always wash your hands with soap and loads of water. After you have finished working also wash your face.

2.13 Maintaining protection equipment

After every single use thoroughly clean your protection equipment. Wash the mask, boots, gloves and working overall with mild soap water and let them dry.

Store your protection equipment in a dry, cold and clean room. Never store your protection equipment in the same room as the chemicals. Store your protection clothes apart from other clothes. Protection equipment that gets dirty between handling chemicals must be cleaned in accordance with regulations on cleaning of dangerous materials.

2.14 Safe operation

Before starting working the operator must check the correct and safe operation of the machine.

- It is not allowed to sprinkle in foggy and rainy weather or when the wind speed exceeds 4 m/s. The direction of spraying must be adjusted to the wind direction.
- If there are two tractors with spraying appliances working simultaneously, they must not pollute each other's working area atmosphere.
- Never bring personal things in the area of spraying or when handling chemicals. Before every meal thoroughly clean your hands and face and wash out your mouth with fresh water.
- Before using chemicals, check machine operation with clean water.
- The sprayer pump receives the power from the connecting shaft of the tractor by means of the cardan shaft. Drive parts can cause serious injuries so, in order to avoid that , follow the instructions below:
    - To drive the pump a cardan shaft must be used which characteristics are in accordance with the recommendations of the manufacturer and is fitted with a protection cover.
    - Connect the machine to the tractor only if the drive shaft (PTO) is turned off.
    - Connecting and disconnecting of the cardan shaft must be performed only when the engine is shut off.
    - Before activating the drive shaft (PTO) check the number of revolutions and make sure that there are no people or animals in the danger area of the machine.
    - The cardan shaft should be cleaned and greased only when the drive shaft (PTO) is turned off, the engine shut down and the start key removed.
    - Do not engage the drive shaft of the tractor (PTO) without a reason and check if the difference of cardan joint angles is not excessive.

	**WARNING: Do not engage the drive shaft of the tractor (PTO) with the engine not running!**

2.15 Safe maintenance

- Before starting to operate the machine learn how to maintain it.
- Keep the working place clean and dry.
- Do not grease, maintain or adjust the machine while it is moving! Do not touch moving parts of the machine! Turn off the machine and make sure that there is no working pressure in the circulation of the chemicals!
- Do not maintain or service the machine before it is thoroughly cleaned.
- During maintenance and servicing of the machine, remove the start key or disconnect the connections.
- Disconnect the drive shaft of the tractor (PTO) to prevent sudden actuation and operation of the machine.
- Do not inspect the machine without "turning on" safety elements.
- Do not perform reparatory welding on the machine, if you have used ammonium nitrate or any other liquid that contains ammonium nitrate for spraying without having thoroughly cleaned the machine before.
- Do not enter the reservoir to repair or clean it.
- Support and safely mount all parts that need to be lifted during maintenance.
- Keep all of the sprayer’s parts in good condition. Repair damages immediately. Replace worn and damaged parts. Remove excess oil, grease or any other debris.
- Disconnect the battery before you start to adjust the electrical system or perform welding on the machine.
- During maintenance of the machine or cleaning the nozzles use appropriate protection equipment in accordance with the regulations.
- It is strictly forbidden to release chemicals into the environment.

2.16 Road transport

Do not drive the machine on public roads. If you have to, you must consider the following instructions:

- Sprayer, connected to the tractor, can only be transported on the road, when the reservoir contains no chemical products.
- Connect the sprayer to the tractor only if the load on the wheels does not exceed the set maximum weight. After connecting the machine, at least 20 % of the tractor's weight must be on driven wheels. You can achieve these values by adding weights at the front and removing weights at the back of the tractor. You can decide on this on the basis of weighing before first operation.
- Sprayer can completely or partially cover the lights and signs on the tractor. In such case, the machine must be fitted with light signals and warnings.
- During road transport of sprayer with the tractor, follow traffic regulations.
- Observe the local traffic code when driving on public roads.

- The sprayer must be equipped with road safety equipment.
- Agromehanika, d.d. provides the sprayer with equipment, complying with the Regulation EU no. 167/2013, and type approval.

2.17 Procedures in accidents with chemicals

If your skin or eyes come in contact with chemicals or their solution, wash them out with plenty of water and repeat the process several times.
In the case of suspected poisoning (symptoms: sweating, dizziness, depression, headache, sickness):

- immediately stop working;
- take off wet clothes;
- remain calm;
- if you feel sick because of consumption of chemicals try to throw up;
- lay on your side;
- immediately call for medical help and let the physician see the label of the chemical, so he or she will be able to determine the type of poisoning easier.

In case of suspected poisoning the patient must not eat or drink castor oil, milk, butter, eggs and alcohol, since these ingredients worsen the poisoning effect.

2.18 Regulations regarding machine use

Machine operator and user must be familiar with regulations regarding plant protection.

3 DRIVE - CARDAN SHAFT (NOT INCLUDED)

3.1 Operator's safety

	**WARNING: To avoid accidents and personal injuries, follow these recommendations and safety regulations!**

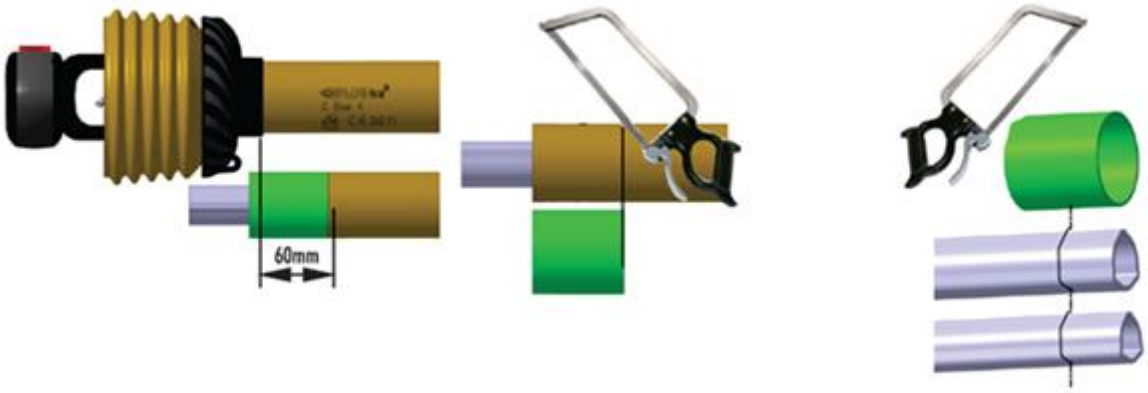
- Before mounting (connecting of the cardan shaft to the tractor and the sprayer) the drive shaft – cardan shaft, **always turn off the engine and remove the start key from its lock**.
- When mounting the cardan shaft, the cardan shaft of the tractor can be easily turned if the engine and the cardan shaft are turned off.
- When mounting the cardan shaft make sure that the safety pin is in right position and well stuck in its hole. Pull and push the cardan shaft forwards and backwards as long as the safety pin is not in its hole.
- Rotating shafts without protection can be very dangerous!
- Always make sure that all of the safety devices are on their place and that all of the rotating surfaces are well covered, including the "junctions" of the cardan shaft on both ends! Do not use cardan shafts without protection!
- Do not touch rotating cardan shafts! The safety distance to a rotating cardan should not be less than 1.5 m.
- Secure protection elements with chain from turning!
- Make sure that the protection of the cardan on the tractor and connection is well connected (attached)!

3.2 Connection of cardan shaft

The first mounting of the cardan shaft should be performed as follows:

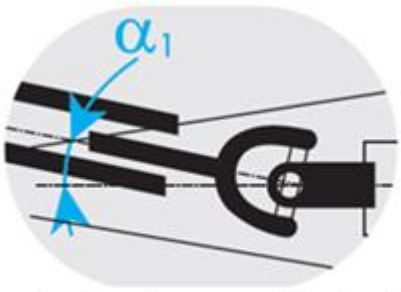
- Mount the sprayer to the tractor
- Stop the tractor’s engine and remove the start key.

- Use the cardan shaft to connect drive output shaft of the tractor and input shaft on the sprayer's pump.
- In the case the cardan shaft is too long and needs to be shortened, pull out the cardan shaft and mount each end of it separately to the shaft of the tractor and to the shaft of the sprayer, measure it out and mark the place where it needs to be cut.
- Use an appropriate tool to shorten both parts in the same way and remove sharp edges.
- Attach profiles and connect both parts of the cardan shaft.

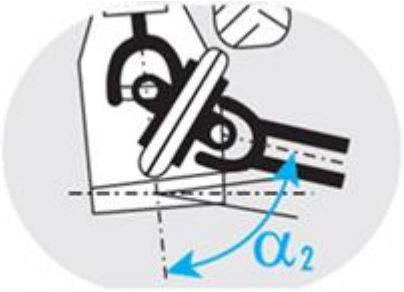


- Mount the cardan shaft between the tractor and the sprayer.

- To ensure a long reliability of the cardan shaft, avoid angles larger than 15°.
- When using safety cardan shafts, fit an Allen screw with torque of 40 Nm. Check the torque after two (2) minutes of operation.



Kardanska gred z enojnim zglobom (<15°)



Kardanska gred s širokokotnim zglobom (<80°)

	**WARNING: Always mount the female end of the cardan shaft to the tractor! Connect the chains in order to prevent rotation of safety covers!**
	**WARNING: Covering of cardan pipes must be at least 150 mm!**

4 SAFETY SIGNS ON MACHINE AND INSTRUCTIONS FOR USE

Machine and instructions for use contain safety and warning signs. Take a closer look to ensure your safety. Follow instructions and guidelines, referring to safety measures, given in the previous chapter.

Ensure that the safety signs are well visible. Ensure that you have all required signs after servicing or replacement of parts. Safety signs are available at authorized dealers.

CE	CE declaration of conformity		Warning: presence of poisonous chemical products!
	Warning: symbol, indicating possibility of personal injury or damage of the machine!		Warning: maximal allowed pressure in the spraying device (12 bar)!
	Warning: keep away from rotating drive shafts!		Warning: direction of cardan shaft rotation.
	Warning: read the instruction manual before connecting the device to the tractor for the first time!		It is prohibited to clean, grease or maintain the device as long as it is running!
	Prohibitions!		It is not prohibited to smoke while working!
	It is prohibited to remove any of the safety devices on the machine!		It is prohibited to enter the reservoir!
	Recommendations.		If the cabin of the tractor is not constructed in an appropriate way, use your gas mask while working.
	Use protective gloves while working.		Use protection clothing while working.
	Use ear protection while working (applies only to sprayers).		Water for washing of hands. **Warning: this water is not drinkable!**

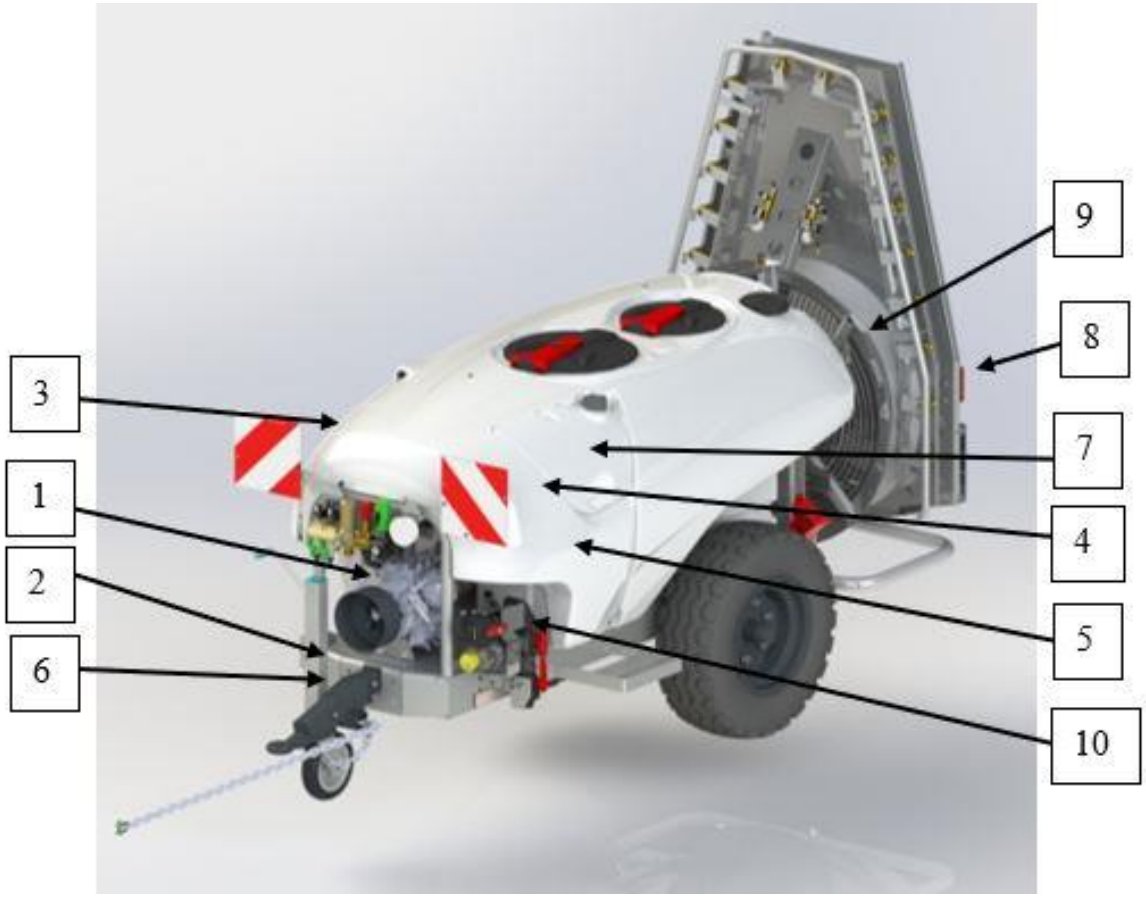


Figure 4.1

Legend	
1 Pump identification plate	6 Sign for number of revolutions of tractor's drive shaft (PTO)
2 Sprayer identification plate	7 Sign for the reservoir containing clean water for hand washing
3 Litre scale	8 Signal lights
4 General safety signs	9 Speed adjustment and multiplier gearbox deactivation sign
5 Signs for correct manipulation	10 Control signs

5 DESCRIPTION

The mist blowers described in these instructions for use are modern machines, equipped with a polyethylene reservoir with rounded edges, smooth interior walls and a sloping bottom. Their structural design ensures a short barycentre distance between the tractor and the machine, a well-stirred spraying agent mixture, complete drainage of the tank and a simple cleaning process.

The fan, located at the rear side of the mist blower, directs the air to the left, to the right and to the whole height of the habitat. Due to the prolonged distance of drops through the habitat, the airflow is directed diagonally to the row. Hence, the drift of the protective agent towards the tractor is reduced to a minimum

The fan enables the user to adjust the speed and amount of air to the type of plantation and to the lushness of vegetation.

5.1 Machine transportation

When the mist blower is loaded on or unloaded from a truck, the standard linkage points on the sprayer's chassis should be used (Marked - Figure 5.1). When using a forklift, use the bottom part of the support chassis.

Figure 5.1

5.2 Sprayer component parts

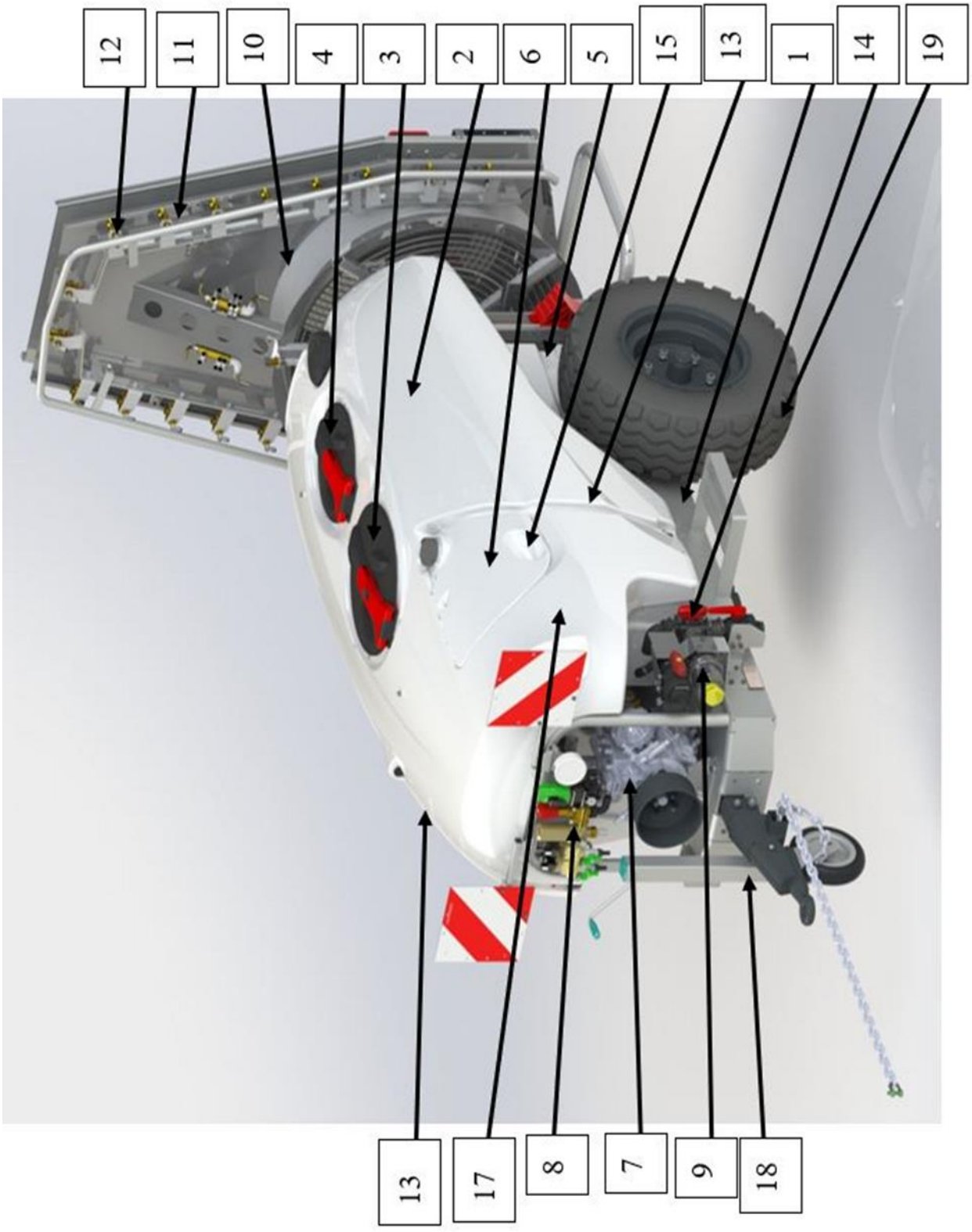


Figure 5.2

Legend	
1 Chassis	11 Protective spraying arc
2 Main reservoir	12 Height-adjustable nozzle holder with nozzle inserts
3 Reservoir lid - main	13 Litre scale
4 Reservoir lid - small	14 Main reservoir emptying valve
5 Rinsing reservoir	15 Hand washing tap
6 Hand washing reservoir	16 Nozzle consumption table
7 Pump	17 Safety and warning labels
8 Pressure regulator	18 Support wheel
9 Suction filter with control valves	19 Rim with tire
10 Casing with a fan	

5.3 Machine identification

5.3.1 Machine identification plate

Attached to the front side of the sprayers and contains following important information:

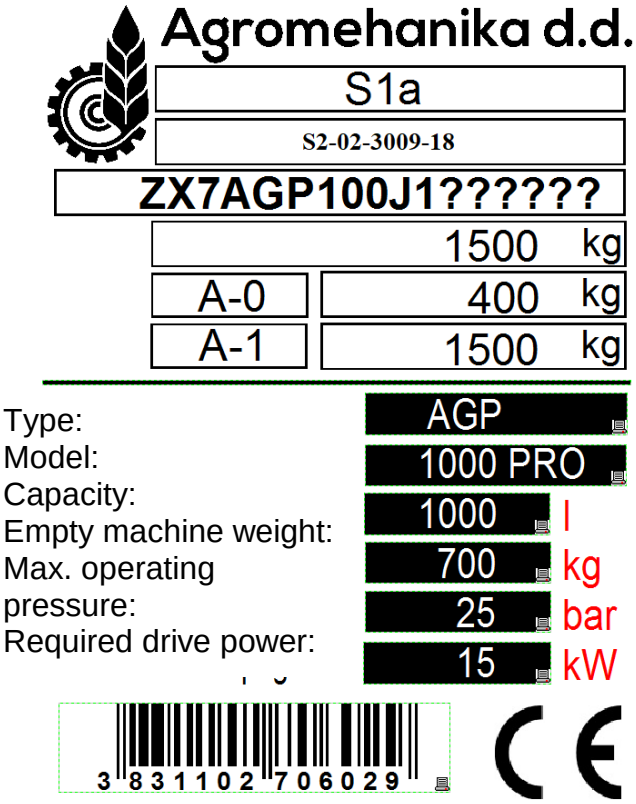
	• name and address of the machine manufacturer, • product type, • model, • capacity (size), • empty machine weight, • allowed total weight, • allowed max. working pressure, • required power of drive, • production year and • serial number and • CE conformity marking.

5.3.2 Pump identification plate

It is located on the pump and contains all the main information about the characteristics of the pump:

	• name and address of the pump manufacturer, • pump type, • nominal flow, • max. flow at maximum allowed rotation frequency and maximum allowed working pressure, • required power of drive, • type of lubricant in the pump, • serial number of pump and • CE conformity marking.

5.3.3 Type approval plate



- Manufacturer's name
- Vehicle type
- Approval mark
- VIN code
- Gross weight
- Maximum weight on the towing bar
- Maximum axle load
- Product type
- Product model
- Container capacity
- Empty machien weight
- Maximum operating pressure
- Required power capacity

6 ATTACHING THE MIST BLOWER TO THE TRACTOR

6.1 With a movable towing bar

Trailed mist blowers can be attached to the category I and II three-point linkage system of the tractor (diameter of coupling bolts 22 mm or 28 mm).

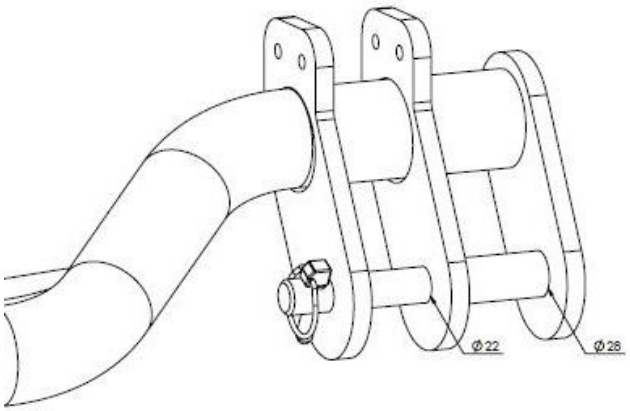


Figure 6.1

The shape and the position of the connection point on the mist blower enables different ways of attachment to the tractor, both with standard top links with eye couplings and newer automatic top links.

In the first case, the attachment is performed by removing the coupling bolt and placing the tractor’s top links to the position intended for the linkage categories used.

After inserting the two coupling bolts through the eye of the left and the right top link, push the bolts back to their place and secure them against falling out with the provided pins.

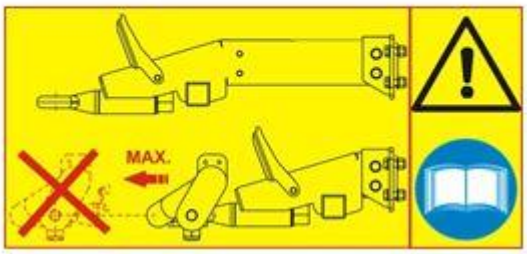
If the tractor is equipped with automatic hitch hooks, you are not required to remove the coupling bolts but only select the necessary linkage size for performing the attachmentins.

6.2 To the tractor's linkage (towing) bar

If the complete removal of the mist blower's towing bar is necessary, the machine must never be connected to the lower lift arms of the tractor but to the linkage (tow) bar at the rear end of the tractor.

WARNING: When the mist blower is attached for the first time, pay attention to the following:

- **check the correct pressure in the tractor's (see the tractor's operating instructions) and the mist blower's tires and adjust if necessary;**
- **make sure that the pressure regulator does not bang against the tractor cab or any other part of the tractor;**
- **if necessary, install a front weight on the tractor (see the tractor's operating instructions);**



Slika 6.2

When the mist blower is appropriately positioned, lift the top links to the operating height or until the mist blower's chassis is in horizontal position (the front and the rear end of the mist blower have the same distance from the ground) and then secure them with the side tensioning rods to prevent lateral oscillation of the mist blower.

Then connect the pump's shaft on the mist blower and the tractor's PTO shaft with a universal joint.

Make sure to use the tractor's PTO drive shaft at the lower speed (540 rpm) to avoid damages to the pump.

6.3 Safety connection of the mist blower and the tractor

Before driving on roads, the chain must be fastened to a suitable place on the tractor to avoid losing the sprayer in case the towing bolt falls out.

Figure 6.3

6.4 Adjustable wheel track

The wheel axle on all trailed mist blowers is connected to the chassis in such a way as to enable a continuously variable track width adjustment. Each axle is laterally attached with four screws, which should be slightly loosened to change the width (the chassis must be lifted from the ground) and then removed or pushed into the carrying tube with the wheel to achieve the desired track width. Then tighten the screws to re-attach the axle (1 - Figure Figure 6.4) and secure them with a counter nut to avoid subsequent accidental loosening of screws.

[cm]	AGP 1000 PRO	AGP 1500 PRO	AGP 2000 PRO
D1	95	102	114
D2	127	145	160

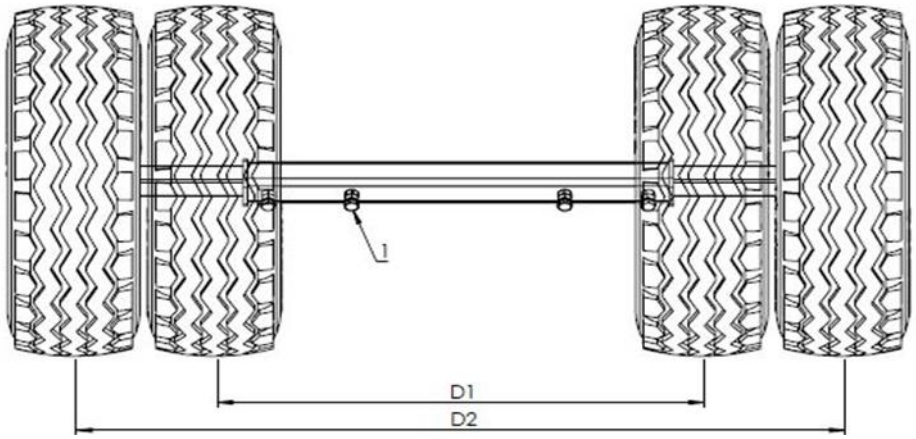


Figure 6.4

7 DETAILED DESCRIPTION WITH OPERATING INSTRUCTIONS

The mist blower's frame is made of a welded steel structure, comprising the main reservoir with a rinsing reservoir and a clean water (hand washing) reservoir. The bottom section contains an integrated pump, suction filters and flow control valves. The rear section of the mist blower contains a blower and a multiplier gearbox. The multiplier gearbox and the pump are connected to the shaft and the flange.

	**WARNING: Occasionally, it is necessary to check the oil level in the multiplier gearbox and lubricate the cross joints on the universal joint (after approx. 50 hours of operation)!**

The front section of the mist blowers also contains a pressure regulator with diverter valves and a control panel that can be transferred in the tractor cab. For more details on the regulators and their components, see chapter 10.

7.1 Reservoir

The reservoirs are all made from chemically resistant polyethylene, featuring rounded edges and smooth interior and exterior surfaces to enable efficient cleaning. The reservoir has a sloping bottom to ensure complete emptying. There is a lid with a strainer mounted at the top of the main reservoir. Do not remove the strainer when the main reservoir is filled with a spraying agent or water.

The front side of the main reservoir contains an engraved litre scale with a transparent hose attached next to it, containing a floating red ball for easier reading of the quantity of chemical agent in the reservoir.

	**WARNING: Do not remove the strainer when the reservoir is filled with water or spraying agents! Use personal protective equipment when handling plant protection products!**

7.2 Lid of the reservoir

The reservoir's lid consists of two parts. The smaller middle lid is used for easier filling of the reservoir with water. It is recommended to use clean water for filling the reservoir (without any dirt particles). Turn the lid to the left to open it or to the right to close it.

Slika 7.1

	WARNING: The lid of the reservoir must be securely closed when operating the machine!

The reservoir is also equipped with a lid, as shown in the picture (Figure **Napaka! Vira s klicevanja ni bilo mogoče najti.**). During the filling process, never insert the hose into the reservoir through the lid and make sure the filler hose is not touching the spraying agent to prevent contamination of the supply end of the hose. In the event of a pressure drop in the hose, the spraying agent may be drawn back into the filler hose.

Slika 7.2

7.3 Reservoir for rinsing

The reservoir for rinsing is intended for washing of the reservoir and other elements after you have finished working or after a break. Fill the reservoir with clean water. You can find more detailed instructions in the chapter 8.1.3.

7.4 Reservoir for washing hands

This reservoir is intended for washing hands after handling insecticides. Fill the reservoir with drinkable water. Its capacity is 15 litres (see technical data).

	WARNING: This water is not suitable for drinking!

7.5 Mixing nozzle

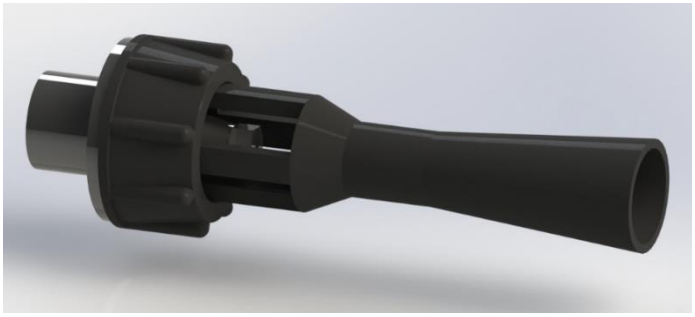


Figure 7.3

To ensure better mixing, the machine is fitted with one or two mixing nozzles, integrated into the bottom part of the reservoir. The mixing nozzle is controlled by means of the diverter valve mounted on the pressure regulator. The mixing nozzle is active when the diverter valve is open. During the preparation of the spraying mixture and when driving to the field, it is recommended to keep the mixing nozzle in operation.

7.6 Suction filter

The suction filter is mounted between the reservoir and the pump. Its function is filtering the insecticide before it reaches the regulator. The size of the filter is 50 MESH.

7.6.1 Cleaning filter insert

Firstly, unscrew the yellow lever (3) on the filter cover (2) by turning it counter clockwise and pulling it out. The valve mounted inside the filter will close the flow of the liquid from the main reservoir. Unscrew the nut (5) from the filter cover and remove the cover and the filter insert (4). Clean the filter insert and mount all parts back together in the reverse order.

When mounting the parts back together, make sure that the metal pin of the locking valve, which is located at the extracted part (with a yellow lever) will be properly inserted, otherwise the filter will not function properly.

Figure 7.4

WARNING: Use protective gloves when cleaning the filter!
Clean the filter insert before each filling of the reservoir!

7.7 Nozzle for cleaning interior of main reservoir

 **Figure 7.5**	Nozzle is mounted in the interior of main reservoir and is intended for washing of reservoir's interior after finished spraying. It is connected to one of the supply valves on pressure regulator, which, when open, provides required water for cleaning.

	**WARNING: The nozzle shape shown in the figure is symbolic and may not reflect the actual state of equipment on the mist blower!**

7.8 Strainer and packaging cleaner

This accessory ensures easier handling of spraying agents. The strainer contains a special nozzle, which directs the liquid from the nozzle towards the bottom part of the strainer to flush out the spraying agent (powder) added through the strainer. It also enables packaging cleaning. The cleaner is attached to the one-way diverter valve of the pressure regulator or directional control valve by means of a hose connection between the valve and the mixing nozzle.

When the diverter valve for packaging and strainer cleaning is opened, it is necessary to adjust the pressure (5-10 bar). This activates the strainer rinsing function, which is useful for rinsing powder-based spraying agents (1). If liquid spraying agents are used, the protective film under the packaging lid can be penetrated with the pointy top of the rinsing nozzle. (2). When the entire content of the packaging (bottle) is emptied, push the neck of the bottle or plastic container over the nozzle and to the limiter (3). This activates the nozzle, which thoroughly washes the inside of the packaging. When the packaging is removed, the flow is closed.

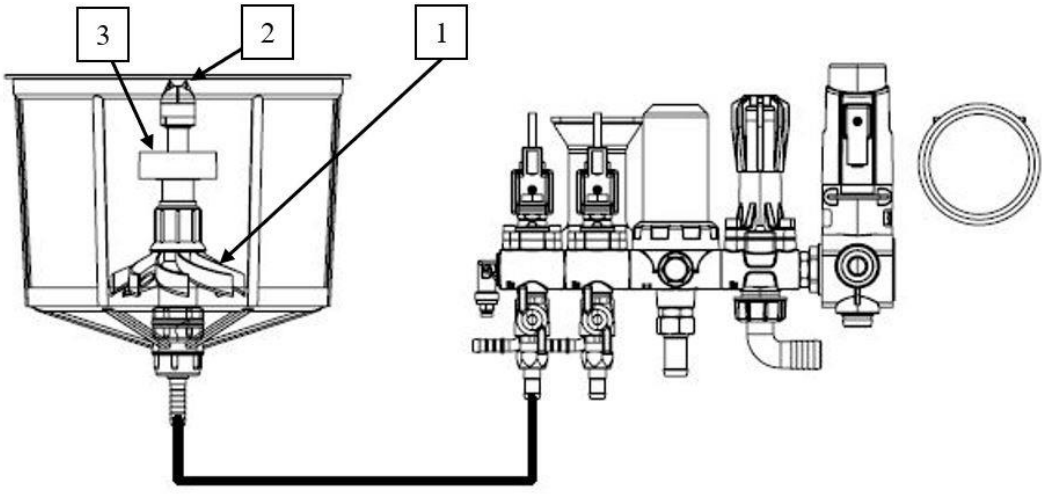


Figure 7.6

7.9 Blower

There are two blowers available that differ in the height of the blower and the number of nozzles:

- 1700: blower with a height of 1700 mm and 18 nozzles (option of individual closing and adjustment of height and direction), with 2 or 4 sections. This model is primarily used in fruit growing, but it can also be used for other plantations and crops.
- 1070: blower with a height of 1070 mm and 14 nozzles (option of individual closing and adjustment of height and direction), 2 or 4 sections. This model is primarily used in viticulture, but it can also be used for other plantations and crops.

7.9.1 General description of the blower

Figure 7.7

The blower with an integrated multiplier gearbox and a fan is one of the main components of the mist blower. The external perimeter (air outlet) contains bolted nozzle holders with nozzle inserts and the front section for air inlet contains a bolted protective screen. The blower was designed to produce air containing droplets of spray. Efficient spraying depends on the quality or air current (the amount and speed of air without turbulence). Air current is therefore used to ensure quality transport of droplets from the nozzle to the desired parts of plants

7.9.2 Blower components

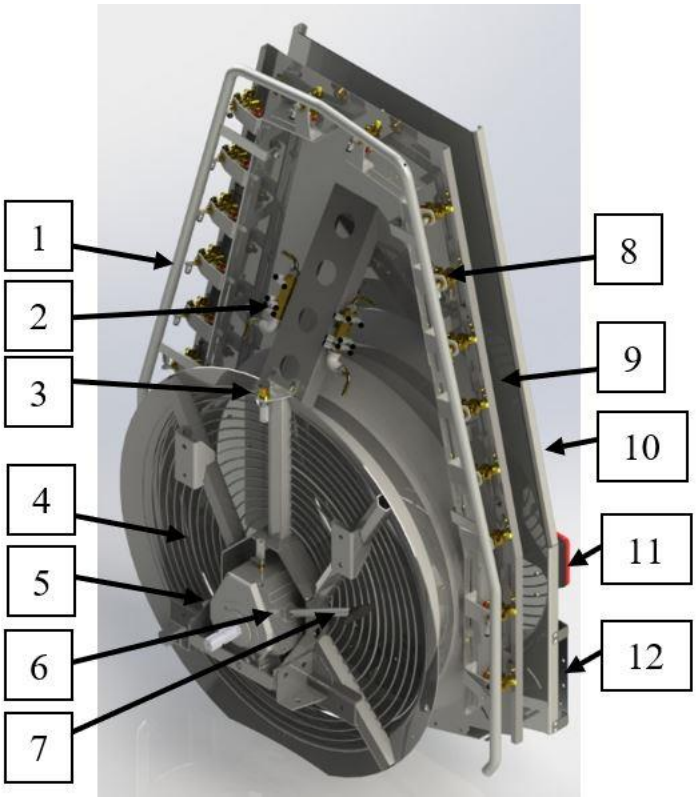


Figure 7.8

1 Safety arc

2 Distribution cube

3 Oil filler plug on the multiplier gearbox and bleed valve

4 Fan

5 Multiplier gearbox

6 Inspection window for oil level check

7 Gear-change and switch-off lever on the multiplier gearbox

8 Nozzle holders

9 Air deflector (tall)

11 Slow moving vehicles reflective triangle bracket

12 Rear lights

12 Reflective boards

7.9.3 Fan

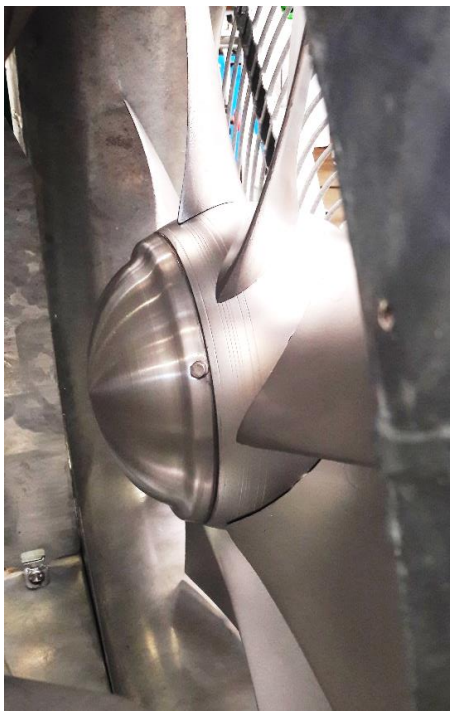


Figure 7.9

The Ø812 fan (33") is driven by the multiplier gearbox.
It contains a centrifugal clutch which ensures a soft starting of the fan.

7.9.4 Distribution cube and adjustable nozzle holders

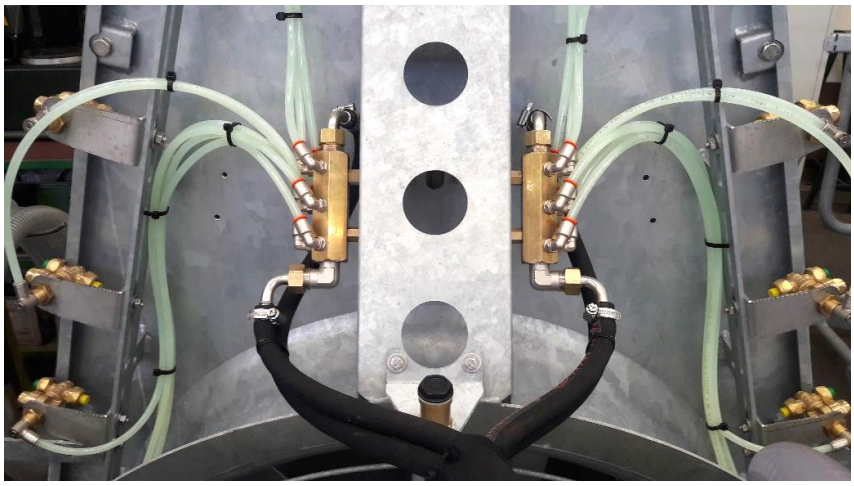


Figure 7.10

- The blower has two distribution cubes designed to distribute the flow to individual nozzles. The air flow can be individually directed through the regulator and two valves to the first or the other section (18/2). If the regulator has four valves, the flow can also be directed to four sections (18/4).
- The nozzle holders are connected to the distribution cube with a flexible hose. It is possible to adjust the height and direction of nozzle holders.

7.9.5 Multiplier gearbox

The multiplier gearbox is used for the transmission of torque from the pump to the fan via the flange. It provides two-speed transmission which can be disengaged to stop the rotation (fan switch-off). The multiplier gearbox and the pump are connected by means of a flange. The multiplier gearbox is lubricated with the SAE 90 oil. It can be checked thought the window (6 − Figure 7.8) and added through the filler plug (3 − Figure 7.8).

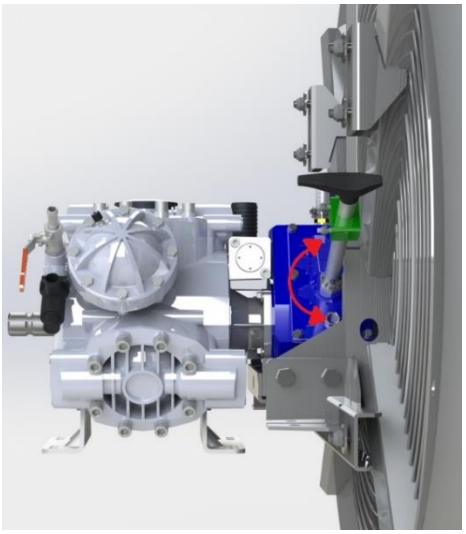
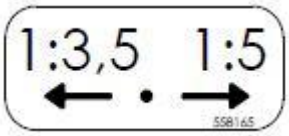


Figure 7.11

SWITCH-OFF AND GEAR CHANGING

The multiplier gearbox with a shaft that propels the fan has a switch-off lever mounted at the side that switches off the rotation or speed level of the fan. This way the mist blower can be used for other purposes (preparing the spraying mixture, mixing, spraying with a manual spraying lance etc.).



	**WARNING: Only switch the fan on and off with the multiplier lever when the PTO drive shaft is disengaged!**

Technical data:

Multiplier gearbox type		COMER D21F
Gear ratio	i	1 : 3,5–0–1 : 5
Lubrication oil		SAE 90
Oil volume	l	1.75

7.9.6 Nozzle holders

As standard, mist blowers are equipped with double diaphragm nozzle holders and various nozzle inserts (nozzles and their flows are described in a separate chapter). Nozzle holders are essentially valves with the following functions:

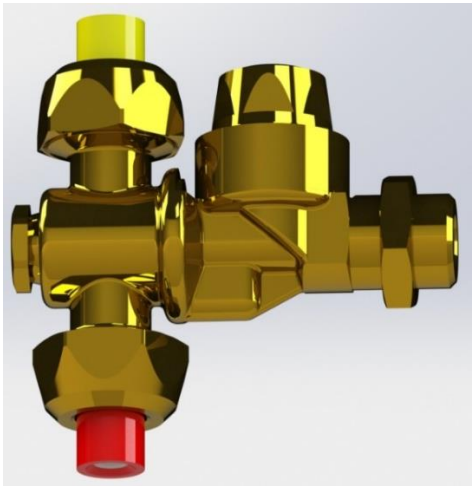


Figure 7.12

- a 90° rotation closes (opens) the liquid flow to the nozzle insert. This enables the opening or closing of individual nozzles, depending on requirements or the height of spraying;
- a 180° rotation opens (closes) the flow through the other nozzle;
- in addition, the diaphragm valve inside the nozzle holder closes the flow at low pressure values (closes at 0.8 bar and opens at 1.5 bar) to prevent the fluid from dripping or leaking out if the flow of the supply or the main valve is closed.

7.10 Blower maintenance

General maintenance work: regular cleaning of nozzle holders, regular checking of the anti-drip diaphragm and nozzle closing functions, checking for and repairing damaged protective screens on the fan. Removing all foreign material (branches, leaves etc.). Checking and, if necessary, fastening all screw connections. Checking the attachment of the multiplier gearbox, flange, pump and fan and oil level check.

8 FUNCTION SCHEMA

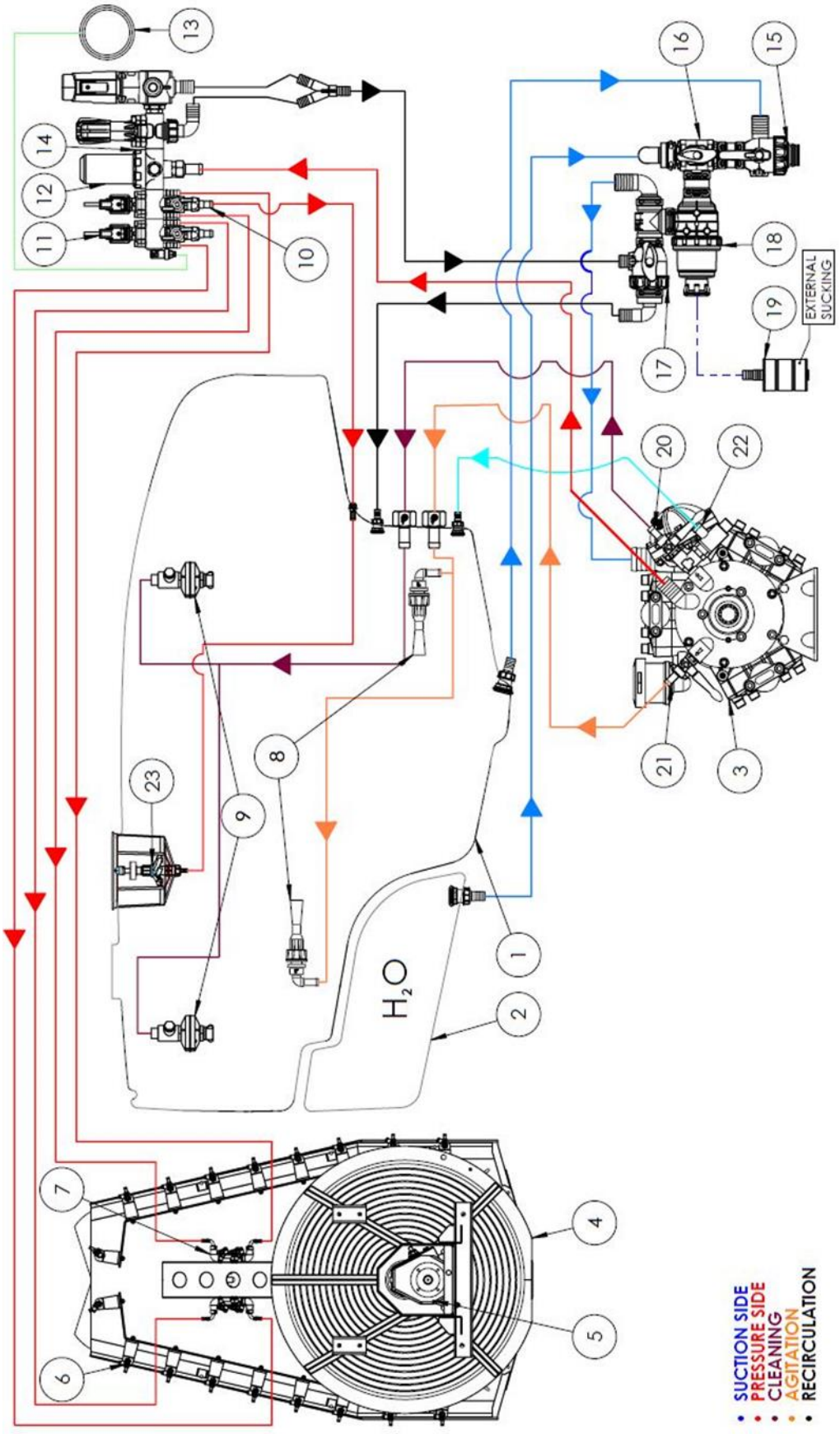


Figure 8.1

Legend	
1 Main reservoir	13 Pressure gauge
2 Additional reservoir	14 Pressure regulator
3 Pump	15 Selector valve and main reservoir drain
4 Blower with a fan	16 Additional reservoir selector valve
5 Multiplier gearbox	17 Regulator return flow selector valve
6 Nozzles	18 Suction filter
7 Distribution cube	19 Suction basket
8 Two mixing nozzles	20 Selector valve on the pump
9 Reservoir rinsing nozzles	21 Selector valve on the pump
10 Selector valve	22 Safety valve on the pump
11 Nozzle opening valves	23 Strainer cleaner
12 Pressure filter	

8.1 Description of spraying and cleaning valves adjustment

8.1.1 Spraying

By means of the three-way valve (15 - Figure 8.1), the spray flows from the main tank through the suction filter (18 - Figure 8.1) and the pump (3 - Figure 8.1) into the pressure regulator (14 - Figure 8.1).

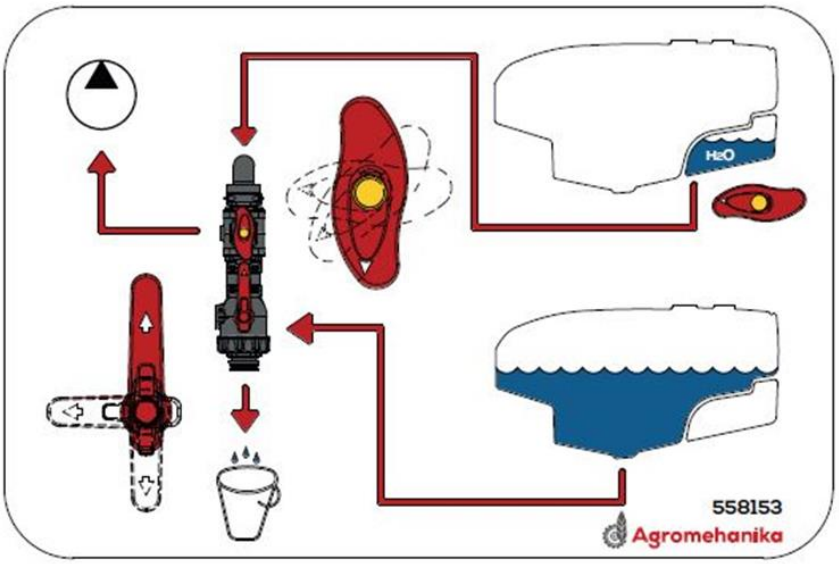


Figure 8.2

Open the ball valve on the pump (21 - Figure 8.1) to mix the spray by means of the mixing nozzle (8 - Figure 8.1) and open the supply valve for nozzle sections (11 - Figure 8.1). The flow direction through the three-way valve is indicated with an arrow on the valve lever. Make sure that the selector valve (17 - Figure 8.1) is open so that the excess liquid from the pressure regulator is directed towards the main reservoir.

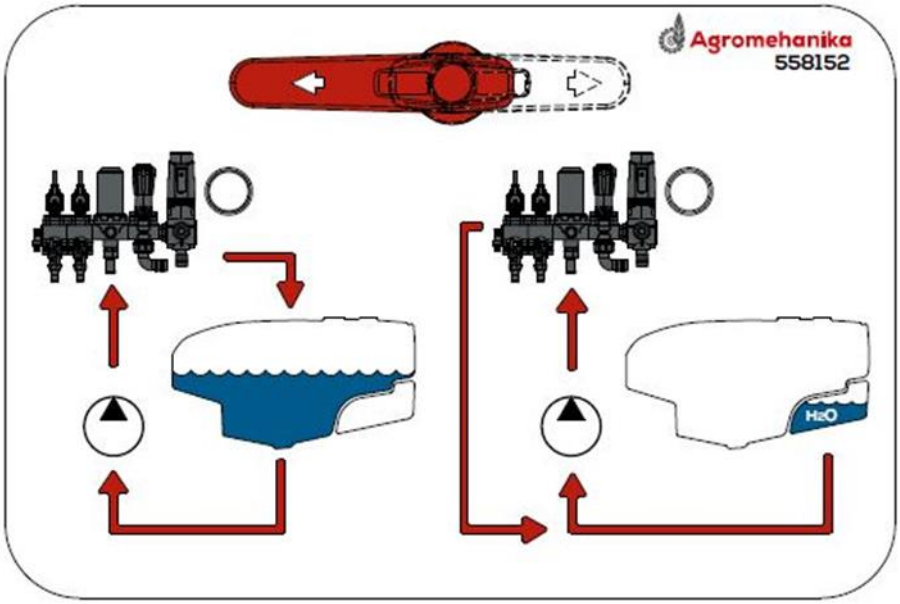


Figure 8.3

8.1.2 Complete cleaning

Complete cleaning of the mist blower includes the cleaning of all interior parts, consisting of the main reservoir (1 - Figure 8.1), suction filter (18 - Figure 8.1), pump (3 - Figure 8.1), pressure regulator (14 - Figure 8.1) and nozzles (6 - Figure 8.1).

The lever of the three-way valve (16 - Figure 8.1) must be adjusted so that the flow from the washing reservoir is open (2 - Figure 8.1). Make sure that the mixing nozzle supply valve (21 - Figure 8.1) and the valve for reservoir washing nozzles (20 - Figure 8.1) on the pump are both open. The flow into the main reservoir through the pressure regulator and three-way valve (17 - Figure 8.1) must be open.

After pumping the water from the washing tank, move the lever of the three-way valve (16 - Figure 8.1) to the position for pumping from the main reservoir and then completely drain the main reservoir through the nozzles on the spraying tubes by opening the diverter valve (11 - Figure 8.1.

8.1.3 Partial cleaning

Partial cleaning of the machine includes the cleaning of the suction filter (18 - Figure 8.1), the pump (3 - Figure 8.1), the pressure regulator (14 - Figure 8.1), the distribution cube (7 - Figure 8.1) and the nozzles (6 - Figure 8.1) without changing the concentration of spray in the main reservoir.

Turn the three-way valve (16 - Figure 8.1) towards the rinsing tank (2 - Figure 8.1) and redirect the flow directly to the pump (3 - Figure 8.1) with the selector valve (17 - Figure 8.1). Close the mixing valve on the pump (21 - Figure 8.1) Clean water flows through the filter (18 - Figure 8.1), the pump, the pressure regulator (14 - Figure 8.1) and open valves (11 - Figure 8.1) and finally through the spraying nozzles. The amount of spraying agent in the main reservoir remains the same).

9 ADDITIONAL EQUIPMENT

Additional equipment includes the elements which are not part of the standard mist blower equipment but can be additionally mounted to facilitate or improve the operation of the machine. It includes:

- the external cleaning kit,
- the packaging and strainer cleaner under the lid,
- the electronic regulation with remote control (chapter 10.2),
- the suction basket with a 5 m suction hose,
- nozzle holder for spraying tall crops.

9.1 External cleaning kit

Figure 9.1

After the spraying is finished, the mist blower must be cleaned. The most appropriate place for cleaning is at the edge of the area that was sprayed. For this purpose the external cleaning kit is used, which contains:

- a spraying lance,
- a flexible hose and
- an adapter for attaching the spraying lance to the pressure regulator.

Connect the connection adapter of the kit to the free diverter valve on the pressure regulator or to the selector valve (23 – Figure 8.1).

Move the other valves on the spraying device into the position for partial cleaning of the mist blower (see previous chapter).

9.2 Packaging and strainer cleaner under the lid

The packaging and strainer cleaner is designed to wash the packaging of liquid plant protection chemicals or to flush the powder-based spraying agents from the strainer into the reservoir. It is installed under the lid of the reservoir and connected to the diverter valve on the pressure regulator. When the diverter valve for packaging and strainer cleaning is opened, it is necessary to adjust the pressure (5-10 bar). Remove the lid (yellow) from the funnel of the cleaner, penetrate the protective film under the lid using the sharp section of the nozzle and push it against the limiter (1). When the packaging contents have been emptied, push the neck of the bottle or the plastic container, together with the limiter (2), down towards the bottom of the pouring sieve. This opens the valve and activates the nozzle, which thoroughly washes the inside of the packaging. When the bottle is removed, the valve closes the rinsing water supply.

When washing the packaging, the lid of the reservoir must be closed because the rinsing nozzle of the strainer, mounted at the bottom of the cleaner, is also active when the liquid supply to the packaging cleaner is opened.

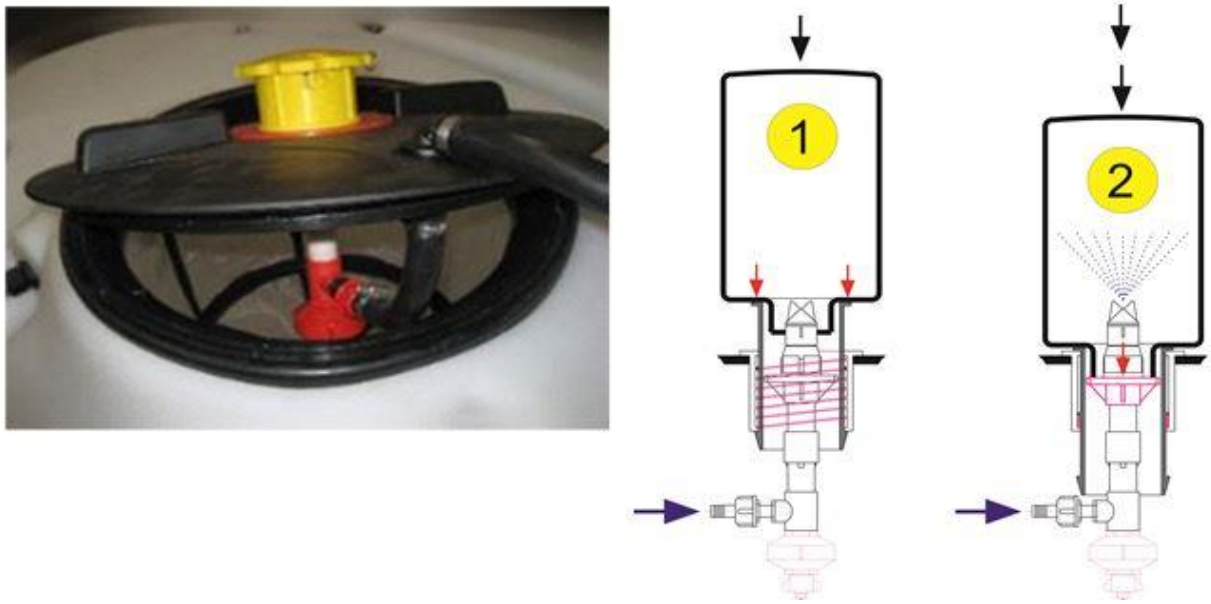


Figure 9.2

	**WARNING: Use safety gloves when handling plant protection products!**

9.3 Suction basket

The suction basket is designed to pump water from ponds, streams and wells into the main reservoir through the filter, the pump and the regulator. It consists of a suction basket, 5 meters of suction hose and an end fitting. The end fitting is mounted on the hose, which is then mounted on the filter. Stretch the suction hose and submerge the suction basket in the water. Please note that the suction height (the height difference between the water surface and the pump) significantly affects the load on the membranes of the pump. The height difference between the pump and the surface of the water should not exceed 3 m. Before activating the pump, turn the three-way valve (17 – Figure 8.1) to direct the water into the main reservoir. Make sure that the other valves are closed. The water current travels from the suction basket (19 – Figure 8.1) and through the suction filter (18 – Figure 8.1), the pump (3 – Figure 8.1), regulating valves (14 – Figure 8.1), the three-way valve (17 – Figure 8.1) into the reservoir (1 – Figure 8.1).

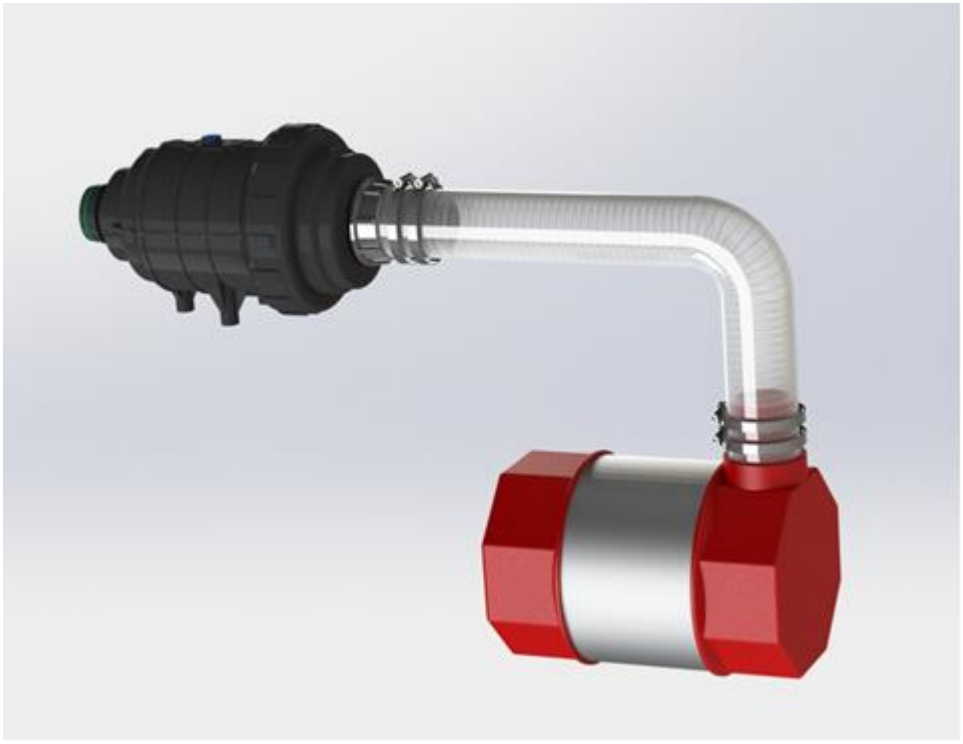


Figure 9.3

	**WARNING: Be very careful when pumping from a pond because even a moment of inattention can cause the water in it to be poisoned!**

9.4 Nozzle holder for spraying tall crops

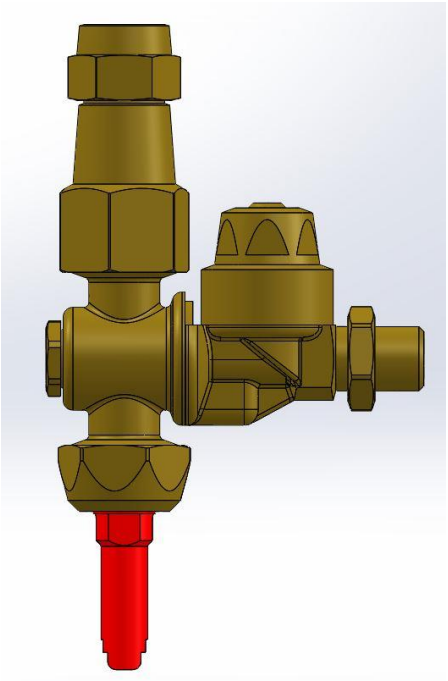


Figure 9.4

When standard nozzle holders cannot reach the required spraying height because the fruit trees are too tall, the mist blower can be equipped with nozzle holders for spraying tall crops. These holders are equipped with nozzles and the other side enables changing the nozzle range to a height of up to 5 m using a control nozzle.

Because these nozzles are made for different spraying requirements (range related), the angle of spraying is narrower to reach greater distances, which also reduces the quality of spraying.

Another disadvantage is also that the adjustment changes the nozzle flow which means that it is theoretically impossible to control the consumption of spray. This can only be achieved by conducting practical tests.

The installation method for these holders is the same as for the standard nozzle holders, which is why they can be easily replaced.

10 PRESSURE REGULATOR

10.1 The PR8 pressure regulator

The PR8 high-pressure regulator (Braglia) is one of the newest electrical systems for remote control of spraying with mist blowers.

10.1.1 Manual pressure regulator (PR8F/2EC)

It consists of the main control valve for manual adjustment of operating pressure, high-pressure filter and solenoid diverter valves, which are opened or closed from the control panel installed in the tractor cab.

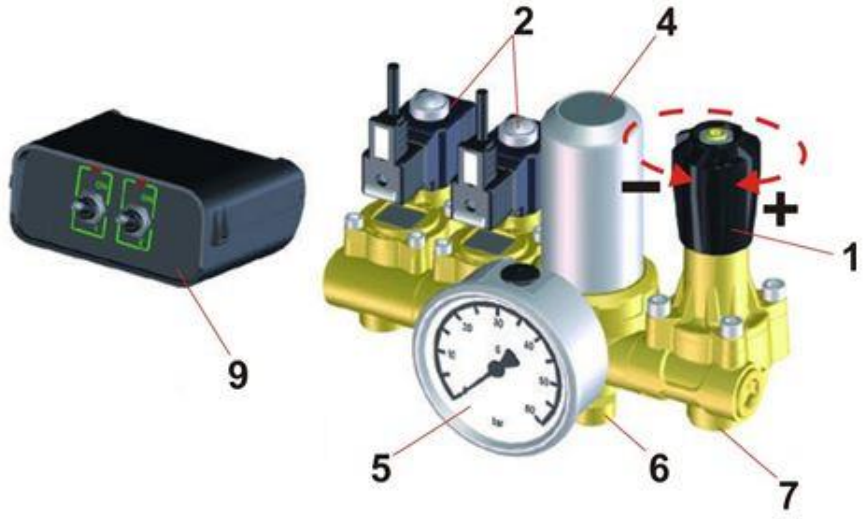


Figure 10.1

1. Manual control valve, operating pressure adjustment
2. Diverter valve
4. Pressure filter
5. Pressure gauge
6. Pressure connection
7. Return line connection
9. Control panel

It is distinguished by:

- a sturdy, robust construction from materials of the highest quality to ensure smooth operation at high operating pressures,
- opening and closing of diverter valves by means of solenoid valves,
- easy operation trough the control panel located at the operator's position inside the tractor,
- safe and uninterrupted work.

10.1.2 Remote pressure regulator (PR8ECF/2EC)

In addition to manual solenoid valve, the improved version of the pressure regulator (EC marking) also features an electric motor operated control valve which enables the adjustment of operating pressure through a control panel installed in the cab. It is available with two or four sections.

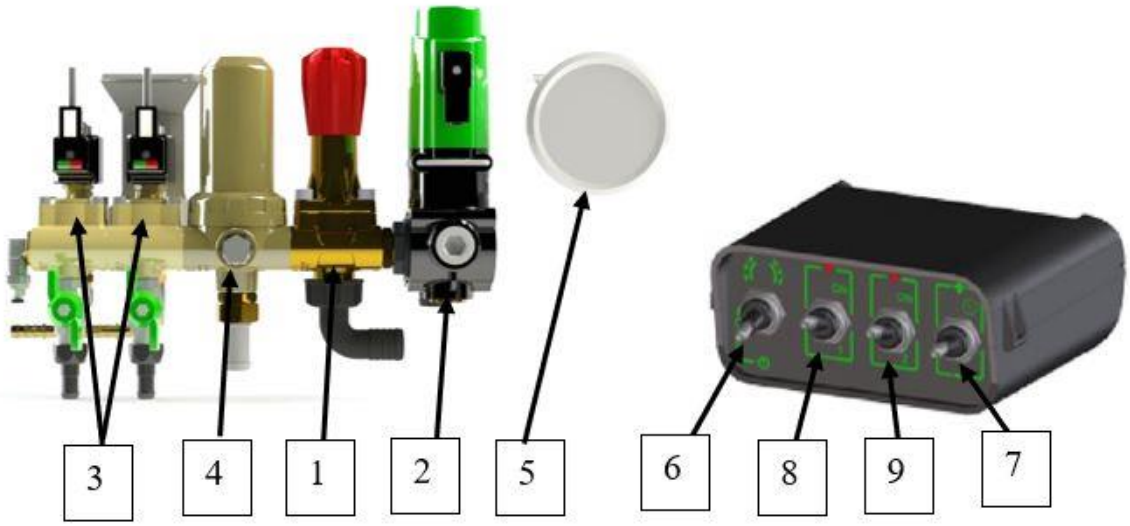


Figure 10.2

1 Manual control valve (max. pressure adjustment)	6 Main switch (ON, READY, OFF)
2 Electric motor operated control valve for remote pressure adjustment	7 Pressure adjustment (+ or -)
3 Diverter valves (2 or 4 sections)	8 Left-side spraying
4 Pressure filter	9 Right-side spraying
5 Pressure gauge	

10.2 The PR9 pressure regulator

The high-pressure regulator PR9 (Braglia) represents the benchmark of quality when it comes to operating the complete range of spraying functions. It is used with the system of complete electronic adjustment or operation of the mist blower's spraying functions and is one of the best methods of computer control and operation of the most important working functions for spraying. The regulator is operated through AG-TRONIK M1, which is specifically designed for mist blowers. It is available with two or four sections.

Due to their volume, the operating instructions for AG-TRONIK M1 are provided as a separate booklet with all the mist blowers that are equipped with this type of control.

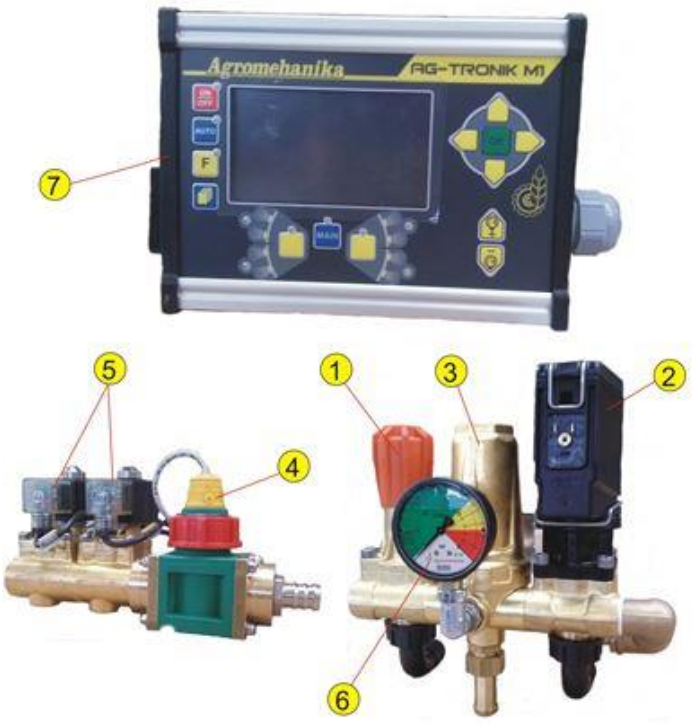


Figure 10.3

1. Manual control valve (max. pressure adjustment),

2. M202 pressure regulator for automatic adjustment of operating pressure,

3. Pressure filter,

4. Flow sensor,

5. Diverter valves (2 or 4 sections),

6. Pressure gauge,

7. AG-TRONIK M1.

10.3 Regulator markings

10.3.1 Standard models

The marking on the regulator consists of the regulator type, the pressure filter and the number and type of diverter valves installed.

Example: The PR8ECF/2EC marking indicates the pressure regulator PR8 with remote pressure adjustment, high pressure filter (F marking) and two solenoid diverter valves (number code + EC).

10.4 Main components of the pressure regulator

10.4.1 Control panel

Figure 10.4

Starting from the basic version, the PR8 pressure regulator enables remote control of opening and closing of diverter valves on the regulator through a control panel installed in the tractor cab

10.4.2 Manual control valve

Figure 10.5

The PR8 control valve enables manual adjustment of operating pressure between 0 and 20 bar, with the maximum flow rate capacity of 160 l/min at an operating pressure of 2 bar. The pressure decreases when the plastic nut at the top of the control valve is turned to the left (-) and the pressure increases when it is turned in a clockwise direction (+).

WARNING: Make sure not to unscrew the nut too much when decreasing the pressure (to reduce the operating pressure below 1 bar), otherwise the nut may fall off the regulator, along with other vital parts of the regulator!

10.4.3 The PR8 electric motor operated control valve

Figure 10.6

In addition to a control valve, the EC version of pressure regulator is also equipped with an electric motor operated control valve, which enables the adjustment of operating pressure from the tractor cab

WARNING: During normal use, make sure that the manual control valve is fully tightened, otherwise it cannot be controlled through the solenoid valve!

10.4.4 The PR9 electric motor operated control valve

Figure 10.7

The electric motor operated control valve for automatic pressure adjustment is an integral part of the PR9 high pressure regulator.

10.4.5 Pressure filter

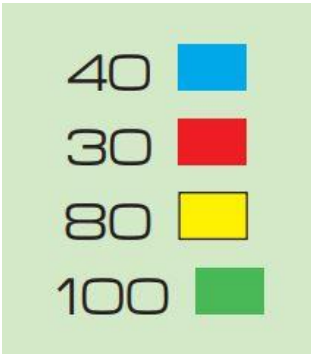


Figure 10.8

The PR8 and PR9 pressure regulators feature a robust and sturdy high-pressure filter. The filter contains a stainless steel mesh filter insert with a standard density of 80 MESH (yellow). The filter density level is indicated by a colour marking at the top of the filter. Because the filter is not only used for filtering, it must be occasionally opened and cleaned.

If powder-based spraying agents are used, it is recommended to clean the filter insert before every spraying to ensure uninterrupted spraying..

10.4.6 Diverter valves

Figure 10.9

Solenoid diverter valve. The solenoid coil is operated through the control panel, which is installed inside the tractor cab (remote control). The valve features a robust design and can be used with operating pressures of up to 40 bar. Its structure is designed to enable a remote supply of one or two connections:

- (1) distribution line for supplying the spraying nozzles on the blower,
- (2) the connection for direct flow with optional manual opening/closing through a ball valve.

10.5 Adjusting the regulator for operation

- Always use clean water to perform adjustments.
- Calculate the necessary driving speed according to spray volume per hectare and flow rate of the mist blower.
- Adjust the required tractor rpm speed according to the calculated driving speed and be careful to ensure the required speed (450 rpm) or maximum number of revolutions of the PTO drive shaft (540 rpm).

10.5.1 Manual pressure regulator (PR8F/2EC)

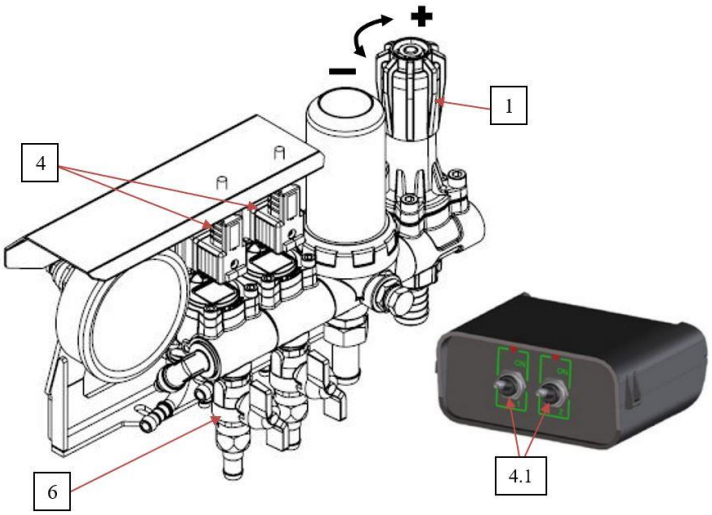


Figure 10.10

- Through the control panel for remote operation (4.1) open the diverter valves supplying the spraying nozzles (4) and the ball valve (6) for mixing.
- Manually adjust the desired value on the control valve (1).

	WARNING: When adjusting the operating pressure, be careful to ensure that the engine rpm speed matches the rpm speed, based on which you have selected the speed of operation!

10.5.2 Remote pressure regulator (PR8ECF/2EC)

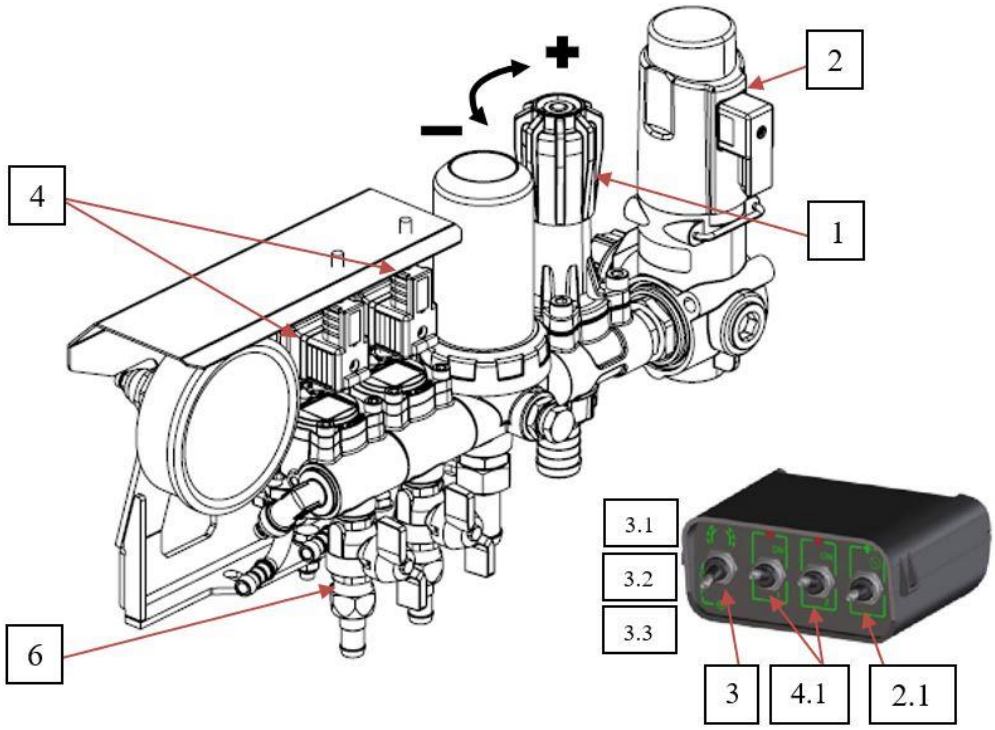


Figure 10.11

Through the control panel with the main switch in position (3.2 or 3.3) and closed ball valves for mixing (6) on the regulator. Using the switch (2.1) on the control panel, increase the max. pressure (hold the switch for 30 seconds). By means of a manual control valve (1) on the pressure regulator, adjust the maximum system pressure (0-20 bar).

Through the control panel for remote operation (the switch is in position 3.1) open the diverter valves supplying the spraying nozzles (4) and the ball valve (6) for mixing.

Using the switch (2.1) on the control panel, adjust the desired operating pressure value according to the calculation. The operating pressure can also be adjusted during driving.

10.6 Pressure regulator maintenance

After each spraying, the regulator must be washed using clean water. The spray residues cause additional corrosion of seals in the regulator, thereby reducing their life span. This maintenance should be performed in accordance with instructions for complete or partial cleaning of the machine, which are specified in a special chapter of these Instructions for use.

Here are some additional instructions for maintenance of individual machine components:

- It is recommended to grease all the sealing joints containing round gaskets.

- Lubricate all articulated parts and threads on the regulator every 40 hours using oil or WD-40. Before attaching the nozzle connections, clean them thoroughly, grease the O-ring seals and assemble them. Slightly rotate the adapter during assembly to avoid damaging the seal.
- Before winter drain all water from the regulator or use an anti-freezing agent (described in the following pages).

	**WARNING: Always wear protective equipment when cleaning the regulator!**

11 PUMPS

Pumps are a vital element of spraying appliances. The reliability and a long durability of the pump also depend on how you treat the pump and whether you use and maintain it correctly.

The pump, which is integrated in the mist blower, belongs to the category of high-pressure piston diaphragm pumps that are made from approved materials for pumping plant protection products and liquid fertilizers used in agriculture, fruit growing and viticulture.

	**IMPORTANT: The standard version of all pumps is equipped with membranes which are made of NBR rubber. Therefore it is the user's duty to use only chemical agents for spraying which do not harm this kind of material. On the opposite, the manufacturer cannot be held responsible for any kind of damage that could occur.**

11.1 Control before use

When the pump is not operating, check the oil quantity in the housing of the pump. Also check the oil level every single time before filling the reservoir. Make sure the oil level is within the marked oil range (Figure 11.2).). If the oil level is too low add some oil whereas be careful not to exceed the maximum allowed level. Only use the oil grade and type specified on the identification plate of the pump. If you intend to use another oil, consult the manufacturer of the pump or the machine.

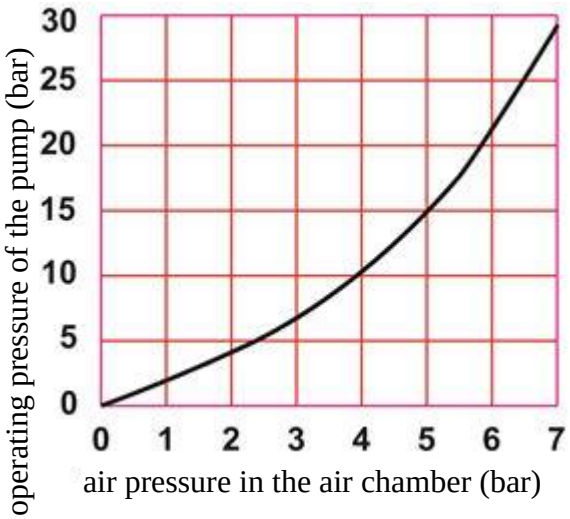


Figure 11.1

The air pressure in the air chamber is determined by the operating pressure of the pump.

The air pressure in the air chamber depends on the working pressure which can be found in the diagram on the left. The air pressure in the air chamber must never be higher than the working pressure of the pump.

Check if the valves are adjusted to allow the flow of fluid from the reservoir to the pump. Also check the throughput of the suction filter insert and the suction hose (make sure it is not bent).

11.2 Use

Before turning on the pump's drive, check if the control valve is open (hold the switch on the control panel [–] for approx. 30 seconds).

	**WARNING: Never turn on the pump's drive when the setting on the regulator enables full load on the pump.**

Turn on the pump and let it run for approximately one minute under minimum pressure in order to aerate the pump and the inlet and the outlet pipes. (increase the pressure [+] using the switch on the control panel.

Be careful not to exceed the maximum allowed pressure and the maximum allowed rpm of 540. On the opposite, the manufacturer cannot be held responsible for any kind of damage that could occur.

11.3 After use

Some chemical agents can shorten the durability of some vital parts of the pump such as rubber membranes and other rubber seals. Therefore a thorough washing of the pump after each single spraying is recommended. To do this, you will need to pump some clean water through the pump. Let the pump operate at working pressure for several minutes. Lower the pressure and let the pump operate for approximately one minute to blow out the rest of the liquid.

During winter, leave all of the water out of the pump and/or protect the pump against freezing (see chapter **Napaka! Vira sklicevanja ni bilo mogoče najti.**).

11.4 Technical data

PUMP MARKING		**APS 121**
NOMINAL FLOW RATE	l/min	120
Max. OPERATING PRESSURE	bar	50
Max. NO. OF REVOLUTIONS	rpm	540
REQUIRED POWER	kW	10,7
NO. OF PRESSURE DIAPHRAGMS	pc	3
WEIGHT	kg	38
OIL	SAE	SAE 30

11.5 Pump maintenance

11.5.1 Oil change

Figure 11.2

Only use the recommended oil (see the table on the identification plate of the pump or on the oil cover of the pump). The first oil change should be performed after 10-20 hours of operation and then every 300 hours of operation or at the end of each working season. During each oil change, also check the condition of pressure diaphragms and replace them, even if not damaged.

11.5.2 The APS 121 pump

To check the pressure diaphragms, loosen the screws on the cover of the pump and remove the cover.

Check the lower and upper side of all pressure membranes while draining the oil.

Assemble the pump in the reverse order.

Before it is re-assembled, it is recommended to wash the inside of the pump and all its vital components with gas oil. Make sure to insert the valves correctly (see the catalogue). Then add oil through the oil cup. When pouring the oil, manually turn the pump's shaft a few times to release the air from the compartment between the piston and the diaphragm. Then start the pump and let it running for a few minutes at minimum pressure. Pay attention to the operation of the pump and add the missing amount of oil, if necessary. Make sure the oil level is around the middle between the max. and min. oil level lines (Figure 11.2).

	**WARNING: Waste oil must be collected in a suitable container and delivered to an authorized collection centre. It must not be disposed in the environment!**

11.5.3 Pump inspection intervals

OPERATION	INTERVAL CHECKS			
	Every 8 h	Every 50 h	Every 300 h	1x per season
Check the oil level	X			
Check the pressure in the air chamber		X		
Check the attachment of the pump on the base		X		
Check the diaphragm and replace if necessary			X	
Oil change			X	
Check the valves			X	
Check the screw joints				X

12 CLEANING THE MACHINE

After every single use of the sprayer, the appliance must be thoroughly cleaned. The best way to use any excess insecticide is to dilute it with water and spray it on the same surface again. The concentration should be at least 10% (10 units of water per one unit of insecticide), the spraying speed slightly faster and the spraying pressure slightly lower (1.5 bar, depending on the nozzle). While doing this, use the additional reservoir for washing. The procedure is described in the chapter **Napaka! Vira sklicevanja ni bilo mogoče najti.**. After that, thoroughly clean the sprayer o n the inside and the outside and also clean all tolls which you have used for spraying (including the tractor). Use only detergents that are recommended by the manufacturer of protection agents! If there are instructions for cleaning of the appliance after using it attached to the instructions for using the insecticide, follow them.

In accordance with the local legislation on washing of the pesticides into the earth, agree on cleaning of your sprayer with your advisory service.

The ablution of pesticides (cleaning of the sprayer) must not be performed on swampy ground or in the near of streams, water dams, dykes or water fountains, etc.

If there is still some insecticide inside the sprayer and if you had to stop working unexpectedly for some time it is recommended to clean the pump, the regulator and the spraying lining with clean water (see chapter 8.1.3).

In the case you had to stop working unexpectedly but did not clean the sprayer yet, you have to assure that other people or animals cannot reach the sprayer.

	**WARNING:** • **Only a clean sprayer appliance is a safe appliance.** • **A clean sprayer appliance is ready to be used.** • **A clean sprayer appliance cannot get damaged by chemical agents or chemical solvents.**

When cleaning the sprayer use appropriate protection clothes. Choose appropriate detergents for cleaning and, if necessary, appropriate insecticide neutralising agents (see recommendations of the insecticide manufacturer).

In the case you are using a mixture of detergent and water for cleaning, pour it into the main reservoir, close the main valve on the pressure regulator, turn on the pump, open the direction control valve for mixing, open the self-cleaning filter valve and only after few minutes open the direction control valves of the nozzles. Be careful when choosing the place for releasing of the cleaning agent. Some detergents become active only after few minutes, so the cleaning process can be slightly longer (see instructions of the manufacturer).

	**WARNING: Be careful while handling detergents; follow the instructions of the manufacturer!**

After cleaning the sprayer with a detergent, fill at least 1/5 of the tank with clean water and repeat the cleaning process. Make sure that you have cleaned all elements that have come in contact with the insecticide or the detergent.

Make sure that you have precisely cleaned all filters. Be careful not to damage the fabric on the filter insert while cleaning filters. If the filter insert is damaged, replace it with a new one. (A more precise description about cleaning of the pressure filter can be found in the chapter 7.6.1).

At the end of the cleaning process, clean all nozzles. Nozzles can be cleaned only by means of a soft brush, compressed air or water. You can damage the nozzle when cleaning it with a hard item.

	**WARNING: In the case your spraying equipment is being cleaned by a high-pressure cleaning appliance, it is recommended to grease all moving parts after every single cleaning !**

Before using aggressive chemical agents, it is recommended to protect the machine with a silicone spray or paraffin oil. After use, clean the machine thoroughly and re-apply silicone spray or paraffin oil.

	**WARNING: If aggressive chemical agents are used, they may chemically react with the zinc-plated parts of the mist blower, leading to corrosion of zinc-plated parts.**

13 MAINTANCE AND STORAGE AFTER SEASON

When the spraying season is over, find some time and prepare the spraying appliance for storage. Before storing the appliance, thoroughly clean the inside and the outside of the sprayer (regulator, pump, sieves, selection valves, nozzles, etc.). When the cleaning is done make sure that there is no water left in the valves, the filters, the pump, the nozzles, etc. Do not maintain the sprayer until it has not been thoroughly cleaned.

13.1 Hoses

Check the tightness of all hoses and hose junctions. Replace damaged hoses with new ones. A damaged hose cost you a lot of time during spraying.

13.2 Surface protection

Some sprays contain solvents with adverse effect on zinc. Remove the rust from the part where the zinc coating is damaged and apply a new layer with a zinc spray.

13.3 Reservoir

Make sure that there are no rests of insecticide inside the reservoir. Chemical agents must not stay in the reservoir for a long time, since they can fast shorten the durability of the reservoir and other parts. Make sure that the outflow valve is opened.

13.4 Pressure regulator

Protect the pressure regulator against moisture and dust. It is recommended to grease moving parts with WD-40 or oil. There are further instructions about the maintenance of the regulator in chapter 10.5.

13.5 Pump

After every season, thoroughly clean the inside and the outside of the pump and prepare it for storage. Check the quantity of working hours and, if necessary, repair the pump (oil change, membrane change, sealing change, etc.) or at least check the oil level, the sealing, etc. This is the most appropriate time of the season to perform some maintenance work. If you are not sure whether or not you can repair the pump on your own, leave the work to an authorized expert. You can find the description about maintenance work in the chapter 11.

13.6 Multiplier gearbox

After each use, check the oil level and check for potential leakage. If you notice oil stains, you must perform a service. Pay attention to unusual sounds during operation.

13.7 Drive/cardan shaft

It is very important that the safety pin, which is attached to the head of the cardan shaft, is clean and greased. This assures that the shaft is safe to use.

Check the protective cover, the functioning and the condition of the cardan shaft every 40 working hours. Replace damaged parts with new ones.

Check the protective cover of the cardan shaft every 100 working hours and, if necessary, replace the sliding plates of the protection. Also check the condition of the cardan shaft. Pay special attention to the safety pin. Replace damaged parts with new ones.

13.8 Bolts

IMPORTANT: Check the bolts, pins and especially safety pins, their tightness and their condition. If necessary, tighten or replace them. The information on the necessary bolt tightness can be found in the table "Bolt tightening torque.

BOLT TIGHTENING TORQUE

Thread	*Wrench size*	*Bolt quality*				
		5.6	**6.9**	**8.8**	**10.9**	**12.9**
M 4	7	1,4 Nm	2,3 Nm	2,9 Nm	4,1 Nm	4,9 Nm
M 5	8	2,8 Nm	4,5 Nm	6,0 Nm	8,5 Nm	10 Nm
M 6	10	4,8 Nm	7,7 Nm	10 Nm	14 Nm	17 Nm
M 8	13	12 Nm	19 Nm	25 Nm	35 Nm	41 Nm
M 10	17	23 Nm	37 Nm	49 Nm	69 Nm	83 Nm
M 12	19	40 Nm	65 Nm	86 Nm	120 Nm	145 Nm
M 12x1,5	16	-	76 Nm	90 Nm	125 Nm	150 Nm
M 14	22	64 Nm	105 Nm	135 Nm	190 Nm	230 Nm
M 16	24	98 Nm	155 Nm	210 Nm	295 Nm	355 Nm
M16x1,5	24	-	190 Nm	225 Nm	315 Nm	380 Nm
M 18	27	135 Nm	215 Nm	290 Nm	405 Nm	485 Nm
M 18x1,5	24	-	325 Nm	325 Nm	460 Nm	550 Nm
M 20	30	190 Nm	305 Nm	410 Nm	580 Nm	690 Nm
M 22	32	260 Nm	415 Nm	550 Nm	780 Nm	930 Nm
M 22x1,5	32	-	-	610 Nm	860 Nm	1050 Nm
M 24	36	330 Nm	530 Nm	710 Nm	1000 Nm	1200 Nm
M 24*1,5	36	-	-	760Nm	1080 Nm	

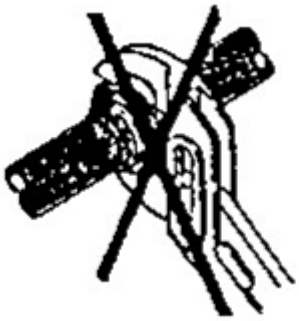
13.9 Hose junctions

Reasons for bad sealing of hose junctions:

- missing O-rings or sealings;
- damaged or poorly inserted sealings;
- dry or re-formed sealing or. O-ring;
- unsuitable joints;
- In the case of bad sealing or leaking:
    - DO NOT TIGHTEN the joint too hard, since you can easily damage it. Take the joint apart and check the condition and position of the sealing or the O-ring, clean and grease it and reassemble the joint.
    - Use only non-mineral grease (bio-grease) for greasing.

REMEMBER:

- it is sufficient to tighten the joint by hand (radial sealing);
- it is sufficient to tighten the joint by a hand tool (axial sealing).



13.10 Other parts

The rest of the vital parts such as filter inserts, pouring sieve, additional equipment, etc. must be thoroughly cleaned, checked and replaced if necessary, too. Remove the remaining water and eventual sediments from parts such as suction filters and three-way valves. Grease all moving and sliding parts of the sprayer.

	**WARNING: If the temperatures get below zero, protect the spraying appliance against cold, which could damage it!**

To protect the appliance against cold, follow the instructions written below:

- either remove all water from the pump, the regulator, the hoses, the filters and other elements of the sprayer;
- either store the appliance in a warm room;
- or use an agent against freezing (antifreeze) in accordance with the following procedure:

After you have finished cleaning the spraying appliance, completely empty the reservoir and pour at least 10 litres of antifreeze agent (a mixture of water and antifreeze) and turn on the pump. Open all valves on the regulator in order the antifreeze agent can reach all hoses and nozzles.

At the end, empty the remaining agent from the reservoir into the tank and let the pump operate for few more minutes in order to pump the remaining agent into the tank.

	**WARNING: Make sure that the antifreeze agent is poured into appropriate containers! Do not discard antifreeze agents in nature!!**

Protect the manometer against freezing by unscrewing it from the regulator and storing it in a warm room. The manometer must be stored in an upright position or the glycerine filling can flow out.

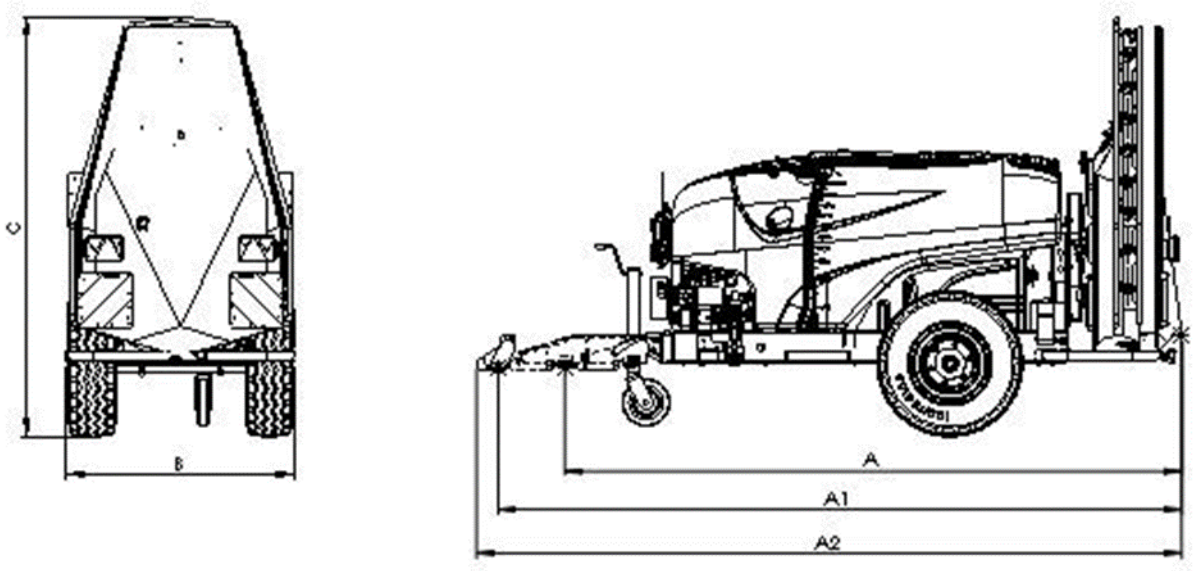
14 POSSIBLE ERRORS

SIGNS OF ERROR	POSSIBLE REASON	CHECK / REPAIR
There is no liquid coming out from the nozzles even though the main valve on the flow regulator is opened.	• damaged or incorrectly fitted valves in the pump • closed manual valve on the suction side • clogged suction of pressure filter • air in suction line	- check and if necessary replace valves in the pump; - check the valves in the suction line leading to the pump; - clean or replace the filter insert; - check the tightness of hose junctions on the suction side.
The insecticide jet is unsymmetrical.	• inappropriate pressure in the air chamber.	- check the air pressure in the air chamber and fill it according to the diagram in the chapter concerning the pumps
The pressure is falling according to the manometer or the working pressure cannot be reached.	• the suction or pressure filter is clogged; • the pressure hose is broken; • the valve of the self-cleaning filter is opened; • incorrectly chosen or too worn nozzle inserts;	• clean or replace the filter insert; • replace the hose; • close the valve of the self-cleaning filter; • check the flow rate through the nozzles – if it is bigger than 10%, replace the nozzles;
The pressure on the manometer is strongly swinging.	• there is some air inside the suction line; • the membranes are damaged.	• check the tightness of the hose junctions on the suction side; • stop the pump immediately; • replace the membranes and the oil inside the pump;
The pump is noisy.	• too low oil level; • exceeded maximum rpm	• control the oil level and add some if necessary; • control the rpm of the pump.
There is some insecticide in the oil of the pump.	• damaged membranes.	- stop the pump immediately; - replace the membranes and the oil inside the pump; - before mounting new membranes, thoroughly clean the inside of the pump with diesel oil.

15 TECHNICAL DATA

TECHNICAL DATA OF THE MACHINE		MIST BLOWER TYPE (DEFLECTOR H =			MIST BLOWER TYPE (DEFLECTOR H =		
		AGP 1000 PRO	AGP 1500 PRO	AGP 2000 PRO	AGP 1000 PRO	AGP 1500 PRO	AGP 2000 PRO
Nominal reservoir volume	l	1000	1500	2000	1000	1500	2000
Rinsing reservoir volume	l	95					
Hand-wash reservoir volume	l	15					
Dimensions (A x B x C)	cm	330 x 120 x 220	350 x 120 x 220	368 x 120 x 220	330 x 120 x 160	350 x 120 x 160	368 x 120 x 160
Length with extended towing bar (A1)	cm	360	380	398	360	380	398
Length with extended towing bar and drawbar (A2)	cm	370	390	408	370	390	408
Empty mist blower weight	kg	670	700	720	645	675	695
Full mist blower weight	kg	1840	2390	2920	1815	2365	2895
Axle load (empty)	kg	625	650	670	600	625	645
Axle load (full)	kg	1510	1960	2400	1485	1935	2375
Attachment load (empty)	kg	45	50	50	45	50	50
Attachment load (full)	kg	330	430	520	330	430	520
Wheel		10.0/75 R15.3"					
		31x15.5 R 15"					
Adjustable wheel track	cm	95-127	102-	114-	95-127	102-	114-
Fan diameter	mm	Ø 812					
Air flow capacity (max.)	m3/h	87000					
Air output speed	m/s	>4					
Multiplier gearbox		Gear ratio: 1:3.5 and 1:5 + idling					
Max. engine revolutions	rpm	540					
Nozzle holder type		Double with a diaphragm anti-drip valve					
No. of nozzle holders		18			14		
Standard type of nozzle inserts		LECHLER TR, ID					
Spraying height (max.)	m	4			3		
Pump		APS 121 (COMET)					
Pump flow rate (0 bar)	l	120					
Pump flow rate (20 bar)	l	117					
Regulator		PR 8 ECF/2EMV					
Required power for pump operation (20 bar)	P (kW)	4.9					

Required power for pump operation (50 bar)	P (kW)	10.7
Required power for fan operation (i = 1 : 5; P (pump) = 0 (bar))	P (kW)	22.6
Total required power for operation (50 bar)	P (kW)	33.3



15.1 Characterization

The spraying appliances are characterised as follows:

For example: AGP 1000 PRO; PR8ECF/2EMV; APS 121; 1070/14/2

- AGP ..... abbreviation for spraying appliances
- 1000 ..... nominal capacity of the reservoir
- PRO ..... version, type
- PR8F/2EMV ..... Regulator type (PR8) with a high-pressure cleaning filter (F) and two (2) diverter valves (EMV)
- APS 121 .... Pump type
- 1070/14/2 …. blower type, height (1070), number of nozzles (14), number of sections (2)

All other technical data for individual components (pumps, flow regulators etc.) can be found in individual chapters. Technical data for nozzles with the tables and examples of consumption calculations are given in the following pages.

15.2 Sprayer disposal

Once the spraying appliance cannot be used anymore, you will have to clean it completely, take it apart and sort the individual components of the sprayer by material. The components must be handed over to an organisation which deals with waste materials. The reservoir and other plastic

parts of the sprayer can be recycled or burned in special incineration sites. The metal parts can be sorted out as scrap metal. Consider the local legislation for waste materials.

15.3 Materials and recycling

RESERVOIR…..PEHD (high density polyethylene)

FLEXIBLE HOSES…..RUBBER, PVC

FRAME…..STEEL

VALVES ….. more or less PA with fibre glass

PRESSURE REGULATOR …. brass and electrical components

NOZZLE HOLDERS ….. brass, rubber, PA

NOZZLE HOLDER HOSES…..PE (polyethylene)

16 COMBINATIONAL MATRIX

MIST BLOWER				PRESSURE REGULATOR					PUMP	BLOWER		OPTIONAL EQUIPMENT			
BASIC VERSION	AGP 1000 PRO	AGP 1500 PRO	AGP 2000 PRO	PR8F/2EMV	PR8ECF/2EMV	PR8ECF/4EMV	PR9ECFM/2EMV	PR9ECFM/4EMV	APS 121	1070	1700	EXTERNAL CLEANING KIT	PACKAGING AND STRAINER CLEANER	SUCTION BASKET WITH A HOSE	NOZZLE HOLDER FOR SPRAYING TALL
1	X			X					X	X		X	O	X	X
2	X			X					X		X	X	O	X	X
3	X				X				X	X		X	O	X	X
4	X				X				X		X	X	O	X	X
5	X					X			X	X		X	O	X	X
6	X					X			X		X	X	O	X	X
7	X						X		X	X		X	O	X	X
8	X						X		X		X	X	O	X	X
9	X							X	X	X		X	O	X	X
10	X							X	X		X	X	O	X	X
11		X		X					X	X		X	O	X	X
12		X		X					X		X	X	O	X	X
13		X			X				X	X		X	O	X	X
14		X			X				X		X	X	O	X	X
15		X				X			X	X		X	O	X	X
16		X				X			X		X	X	O	X	X
17		X					X		X	X		X	O	X	X
18		X					X		X		X	X	O	X	X
19		X						X	X	X		X	O	X	X
20		X						X	X		X	X	O	X	X
21			X	X					X	X		X	O	X	X
22			X	X					X		X	X	O	X	X
23			X		X				X	X		X	O	X	X
24			X		X				X		X	X	O	X	X
25			X			X			X	X		X	O	X	X
26			X			X			X		X	X	O	X	X
27			X				X		X	X		X	O	X	X
28			X				X		X		X	X	O	X	X
29			X					X	X	X		X	O	X	X
30			X					X	X		X	X	O	X	X

Note: O: if this optional equipment is selected, the standard strainer and packaging cleaner must be replaced.

17 GENERAL INSTRUCTIONS FOR SPRAYING

WARNING: The machine IS NOT SUITABLE FOR LIQUID FERTILIZERS! If you intend to make an exception, we recommend that you consult the technical

For a successful spraying, the appropriate water quantity, right nozzle selection and a precise consumption calculation are of major importance. It is recommended to stick to the following order when it comes to preparing of the spraying mixture and spraying:

Make sure that the spraying appliance is in flawless condition. Check the oil level of the pump and clean all filters.

↓

Read the instructions which are attached to the protective agent. Pay special attention to the prescribed concentration, the dose for a hectare and the recommended water consumption.

↓

Choose an appropriate tractor speed and – if you do not have a reliable value – measure it. It is very important to have precise speed values when it comes calculating the quantity of the mixture.

↓

Choose appropriate nozzle type and size according to the crop and required water consumption. Use the nozzle tables.

↓

Fill the reservoir with half of the fresh water you will need.

↓

Adjust the working pressure on the regulator and check the liquid flow rate through the nozzles.

↓

Calculate the required water consumption per hectare according to the measured liquid flow rate through the nozzles and the working speed.

↓

Fill the reservoir with the mixture and add the required water quantity.

↓

While working, pay attention to a constant working speed, the height of the spraying equipment, the working pressure and nozzle operation.

↓

Clean the sprayer after you finish working.

17.1 Connection for checking the pump flow rate measurement

The flow meter for the pump can be connected to the return line of the pressure regulator. To do this, remove the hose fitting and replace it with another fitting to connect the flow meter with the reservoir. During this procedure, all other regulator supply lines must be closed so that the entire amount of liquid is pumped into the reservoir through the return line.

17.2 Nozzle flow rate measurement check

To measure the nozzle flow rate, you will need a piece of flexible plastic or rubber tube with an internal diameter of 25 mm or 1″ and a suitable collection container (a measuring glass is recommended). Simply insert the tube on the nozzle and measure the flow volume on each nozzle by catching the liquid with the collection container. You will also need a timer or a watch to measure the flow volume. The measurement should last one minute. If the measurement is shorter than that, the measured flow volume should be calculated to one minute. If the measured flow volume at the specified pressure exceeds the value from the table by more than 10 %, the nozzle insert is worn out and must be replaced.

18 TYPES OF NOZZLE INSERTS

As standard, all mist blowers are equipped with type TR ceramic nozzle inserts made by a renowned German manufacturer LECHLER.

The nozzle inserts are designed for all types of accurate habitat treatment with plant protection products, which includes spraying with low water consumption.

These nozzle inserts are characterized by an optimum size of droplets, accurate flow and high wear-resistance.

They are ideal for operating pressures of spraying between 2 and 20 bar.

18.1 Tables

18.1.1 Table 1: Active driving time (min/ha)

DRIVING SPEED km/h	INTER-ROW DISTANCE (m)												
	2	2.2	2.4	2.6	2.8	3	3.2	3.4	3.6	3.8	4	4.5	5
3	100	91	83	77	71	67	62	59	56	53	50	44	40
3.5	86	78	72	66	61	57	54	50	48	45	43	38	34
4	75	68	63	58	54	50	47	44	42	39	37	33	30
4.2	71	65	60	55	51	48	45	42	40	37	35	32	29
4.4	68	62	56	52	48	45	42	40	38	36	34	30	27
4.6	56	59	54	50	47	43	41	38	36	34	32	29	26
4.8	62	57	52	48	45	42	39	37	35	33	31	28	25
5	60	55	50	46	43	40	37	35	33	31	30	27	24
5.2	58	52	48	44	41	38	36	34	32	30	29	25	23
5.4	55	50	46	43	40	37	35	33	31	29	28	25	22
5.6	54	49	45	41	38	36	33	31	30	28	27	24	21
5.8	52	47	43	40	37	34	32	30	29	27	25	23	21
6	50	45	42	38	35	33	31	29	28	26	25	22	20
6.5	46	42	38	35	33	31	29	27	25	24	23	20	18
7	43	39	36	33	30	28	27	25	23	22	21	19	17

18.1.2 Table 2: Required aggregate flow rate (l/min)

DRIVING TIME (min)	SPRAY VOLUME PER HECTARE (l/ha)												
	150	200	150	300	150	400	150	500	150	700	150	900	150
15	10	15	10	15	10	15	10	15	10	15	10	15	10
20	7,5	20	7,5	20	7,5	20	7,5	20	7,5	20	7,5	20	7,5
25	6	25	6	25	6	25	6	25	6	25	6	25	6
30	5	30	5	30	5	30	5	30	5	30	5	30	5
35	4.3	35	4.3	35	4.3	35	4.3	35	4.3	35	4.3	35	4.3
40	3.7	40	3.7	40	3.7	40	3.7	40	3.7	40	3.7	40	3.7
45	3.3	45	3.3	45	3.3	45	3.3	45	3.3	45	3.3	45	3.3
50	3	50	3	50	3	50	3	50	3	50	3	50	3
55	2.7	55	2.7	55	2.7	55	2.7	55	2.7	55	2.7	55	2.7
60	2.5	60	2.5	60	2.5	60	2.5	60	2.5	60	2.5	60	2.5
65	2.3	65	2.3	65	2.3	65	2.3	65	2.3	65	2.3	65	2.3
70	2.1	70	2.1	70	2.1	70	2.1	70	2.1	70	2.1	70	2.1
75	2	75	2	75	2	75	2	75	2	75	2	75	2
80	1.9	80	1.9	80	1.9	80	1.9	80	1.9	80	1.9	80	1.9
85	1.8	85	1.8	85	1.8	85	1.8	85	1.8	85	1.8	85	1.8
90	1.7	90	1.7	90	1.7	90	1.7	90	1.7	90	1.7	90	1.7
95	1.6	95	1.6	95	1.6	95	1.6	95	1.6	95	1.6	95	1.6
100	1.5	100	1.5	100	1.5	100	1.5	100	1.5	100	1.5	100	1.5

With the help of these tables you can determine your spray volume per hectare according to the size of nozzle inserts used, operating pressure, driving speed and distance between rows in the orchard or you can determine the required size of nozzle inserts that will meet your demands.

18.1.3 Table 3: Flow rates of LECHLER-TR ceramic nozzle inserts (l/min)

NOTE: FLOW RATES FOR THE SAME COLOUR MARKINGS OF NOZZLES OF VARIOUS TYPES (ST, LU, AD, ID, TR...) AND MATERIALS ARE ALWAYS THE SAME.

CATALOGUE NO.	NOZZLE INSERT MARKING	COLOUR OF NOZZLE INSERT	OPERATING PRESSURE (bar)																	
			2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
019.48.068	**TR 80-0067**	**BLACK**	0.22	0.27	0.31	0.35	0.38	0.41	0.44	0.47	0.49	0.52	0.54	0.56	0.58	0.60	0.62	0.64	0.66	0.68	0.70
019.48.069	**TR 80-01**	**OCHRE**	0.32	0.39	0.45	0.51	0.55	0.60	0.64	0.68	0.72	0.75	0.78	0.82	0.85	0.88	0.91	0.93	0.96	0.99	1.01
019.48.070	**TR 80-015**	**GREEN**	0.48	0.59	0.68	0.76	0.83	0.90	0.96	1.02	1.07	1.13	1.18	1.22	1.27	1.31	1.36	1.40	1.44	1.48	1.52
019.48.071	**TR 80-02**	**YELLOW**	0.65	0.80	0.92	1.03	1.13	1.22	1.30	1.38	1.45	1.52	1.59	1.66	1.72	1.78	1.84	1.90	1.95	2.00	2.06
019.48.072	**TR 80-03**	**BLUE**	0.97	1.19	1.37	1.53	1.68	1.81	1.94	2.06	2.17	2.27	2.38	2.47	2.57	2.66	2.74	2.83	2.91	2.99	3.07
019.48.073	**TR 80-04**	**RED**	1.28	1.57	1.81	2.02	2.22	2.39	2.56	2.72	2.86	3.00	3.14	3.26	3.69	3.51	3.62	3.73	3.84	3.95	4.05
019.48.074	**TR 80-05**	**BROWN**	1.61	1.97	2.28	2.55	2.79	3.01	3.22	3.42	3.60	3.78	3.94	4.10	4.26	4.41	4.55	4.69	4.83	4.96	5.09

18.2 Different calculations

The required volume of water per hectare can be found in the tables or calculated using the formula:

$$\boldsymbol{WATER\ CONSUMPTION\ PER\ HECTARE\ (l/ha) = \frac{600\ X\ NOZZLE\ FLOW\ RATE\ (l/min)\ X\ NO.OF\ NOZZLES}{DRIVING\ SPEED\ (km/h)\ X\ INTER-ROW\ DISTANCE\ (m)}}$$

The necessary flow rate of a nozzle insert for the specified spray volume per hectare and working speed can be calculated with the following formula:

$$\boldsymbol{NOZZLE\ FLOW\ RATE\ (l/min) = \frac{VOLUME\ PER\ HECTARE\ (l/ha)\ X\ DRIVING\ SPEED\ (km/h)\ X\ INTER-ROW\ DISTANCE\ (m)}{600\ x\ NO.OF\ NOZZLES}}$$

The easiest way to check the tractor speed is to drive a certain measured distance and measure the time spent for driving:

$$\mathbf{DRIVING\ SPEED\ (km/h) = \frac{DISTANCE\ (m)\ X\ 3.6}{DRIVING\ TIME\ (s)}}$$

- Example 1:

There are 10 TR-OCHRE nozzle inserts installed on the mist blower, the operating pressure is set to 11 bar, the inter-row distance in the orchard is 3.6 m, the driving speed is 4.2 km/h.

What will be the spray volume per hectare?

You can read from Table 1 that the required time for spraying one hectare is 40 minutes.

You can read from Table 3 that the flow rate of the OCHRE nozzle insert at operating pressure of 11 bar is 0.75 l/min.

You can read from Table 2 that during the time of 40 minutes and with the consumption of 7.5 l/min (for 10 nozzle inserts) the volume consumed is 300 l/ha.

- Example 2:

You would like to consume 300 l/ha with the inter-row distance of 3,.8 m and driving speed of 5.2 km/h. There are 10 nozzles open. Which type of nozzle inserts should you use and what is the required operating pressure for spraying?

For the purpose of this example you can read the driving time per hectare sprayed from Table 1. It amounts to 30 minutes. To achieve such driving time and the consumption of 300 l/ha, the required total aggregate flow rate according to Table 2 is 10 l/min or 1 l/min per nozzle. You can select the corresponding nozzle insert from Table 3; in our case the nozzle type is GREEN for the operating pressure o 9 bar or OCHRE for the operating pressure of 20 bar.

18.3 Recommendations

- Operating speed

Spraying is usually performed at tractor speeds from 3 to 6 km/h. The speed must be adjusted to terrain configuration and, in particular, to the fan capacity. When the operating speed is too high with a low fan capacity, it can greatly reduce the efficiency and quality of spraying.

- Engine revolutions

To ensure quality spraying, select a suitable gear that will allow you to achieve the desired operating speed at higher number of engine revolutions (approx. 500 rpm of the tractor PTO drive shaft). This is the only way to ensure an adequate fan and pump capacity.

- Water consumption

The water consumption range for spraying in the fruit and wine growing sector is wide and ranges between 100 and 1500 l/ha. Due to significant savings, the reduced consumption rate between 100 and 300 l/ha is becoming more and more popular in recent years. Such low consumption rates, however, require greater care when the machine is prepared for work. For this reason, the equipment of the machine must be of high quality, with quality nozzles, pressure filters and air deflectors, while also enabling quality mixing during operation. The amount of spray volume per hectare must remain the same even with low water consumption, which means that the concentration of the spraying agent should be increased by the same factor that was used for reducing the amount of water.

19 NOTES